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The Field for Concrete Common Brick

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A Frank Statement Embracing a Survey of the Possibilities of Concrete Brick Manufacture as an Outlet for Crushed Stone, Sand and Gravel

(Aggregate-producer readers of ROCK PRODUCTS have shown considerable interest in the possibilities of concrete brick manufacture as an outlet for their surplus material. The editor has asked Mr. Curtis to present a frank statement embracing a survey of the possibilities, costs, etc., which he has done in this article.—THE EDITOR.)

THE brick as a unit of masonry construction has had a long career. Generations of designers and builders with brick have given us today many who almost instinctively think of construction in terms of brick and encounter formidable mental inertia when they attempt to think of it in terms of other methods than bricklaying. So brick construction has many adherents whose creed is "build with brick," but so long as they get *good* brick, most of them have no quarrel as to what material it is made of—clay, concrete or sand and lime. Therefore, in competitive markets, the sale of concrete common brick depends primarily on the price at which brick of acceptable quality can be profitably sold.

There are many markets where concrete common brick may compete favorably with clay common brick. The number of clay-brick producing plants has been diminishing, due no doubt to the advances in land values in the cities, forcing clay lands into more remunerative use; the greater cost of coal, a very large expense in clay-burning opera-

Fig. 1—Brooklyn Crozite Brick Corp. plant; capacity 100,000 concrete common brick per day. The large building to the left houses the machinery; the curing chambers are in the center, and at the right are the unstacker and pallet return conveyor

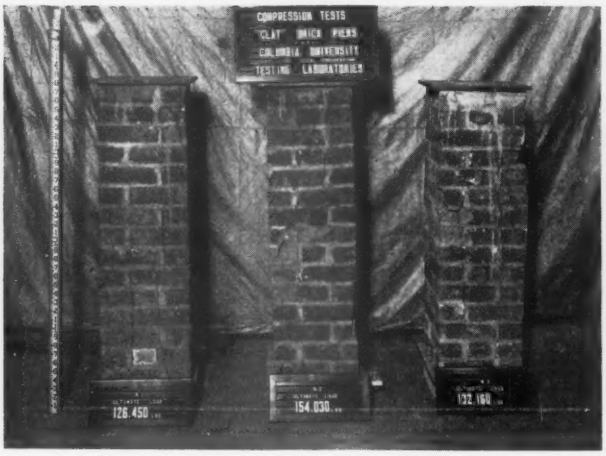

Fig. 2—Compare the loadings which caused failure of these clay-brick piers with those shown in Fig. 3 for comparable concrete-brick piers

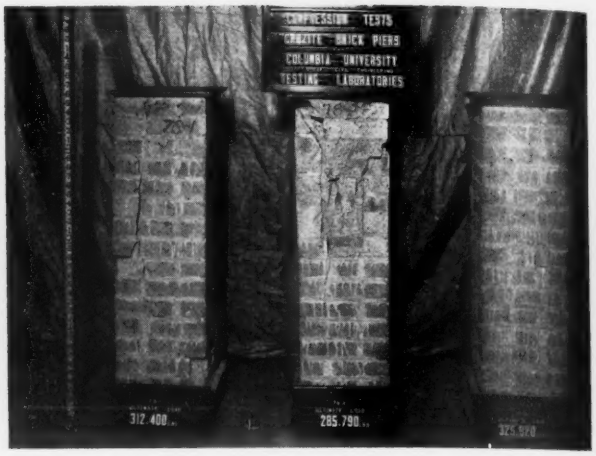

Fig. 3—Failure of concrete-brick piers in the Columbia University tests, showing the extremely heavy loadings sustained

tions, and the increases in freight rates which have narrowed the sphere of operation for each producing plant.

A few years ago it was only occasionally possible for the manufacturer of concrete brick to sell a quality product at prevailing clay-brick quotations and make a reasonable profit. With prevailing freight rates and high prices of coal (which seem likely to remain for an indefinite period), good quality concrete brick may be quite generally produced at a cost which permits sale in even highly competitive markets, with satisfactory returns. It will be noticed that the two big elements of cost increase—coal and transportation—both weigh particularly heavy on clay brick, in the manufacture of which such relatively large quantities of these essentials must be used.

Concrete Brick of High Quality

Concrete common brick have an enviable reputation. Wherever used extensively, they have given general satisfaction. The following lines quoted from a letter received by the writer from the Wells Brothers Construction Co., a firm of nationally known builders, is typical of many:

In connection with the construction of the new Montgomery Ward & Co. building at Portland, we had occasion to use approximately 1,000,000 common brick and 200,000 face brick.

We were approached by the Shope Brick Co. with a view of using their brick, a cement product. I am frank to say that the writer and W. H. McCauley, engineer for Montgomery Ward & Co., were not at all familiar with this product and had never used any product of this nature in any kind of construction. They were such a clean-cut looking proposition and the effects to be obtained from the face brick were so varied that we decided to investigate this material.

The price of these brick was a trifle higher than the clay product as far as the common brick was concerned, but as the size was also larger we figured out that it would be a standoff as far as cost was concerned with possibly a slight saving in laying and in mortar materials.

We visited a number of structures that had been built for some three to five years and found that the results were satisfactory, showing no signs of fading or of deterioration from the weather.

The next point that we raised was the question of the waterproof qualities of the common brick. We found that absorption was practically the same as that of a clay brick, but in this case, as it was an experiment with us, we decided to use a common brick with a trowel surface on the side exposed to the weather to insure even higher

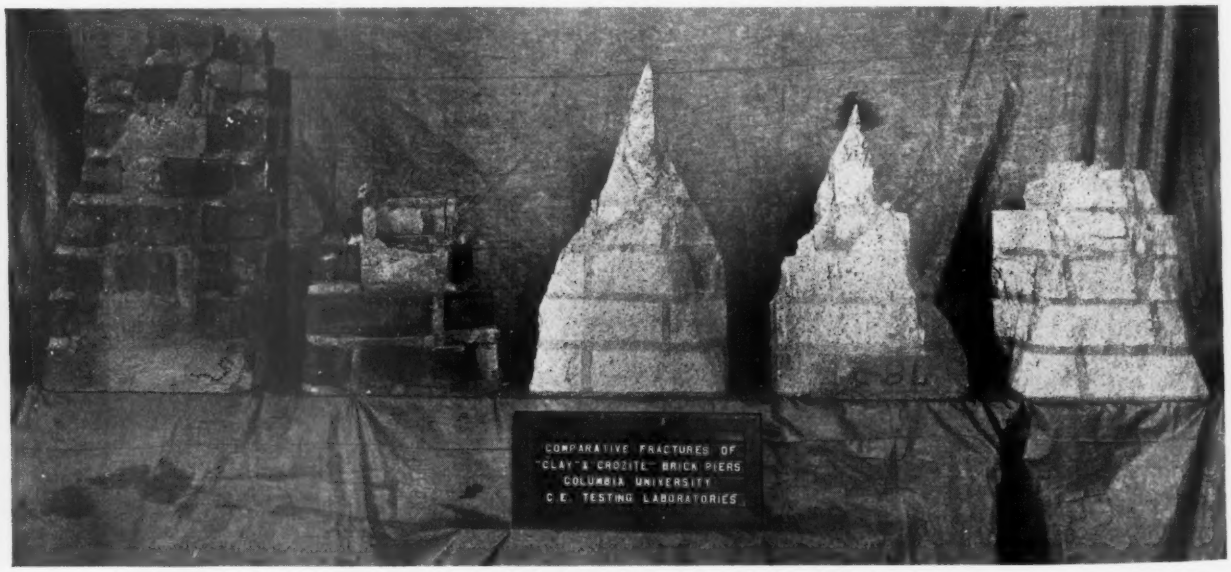

Fig. 4—These specimens tell their own story. They are the remnants of several brick piers recently tested at Columbia University. Failure of the two clay piers at the left was due to pulling of the brick from the mortar; the three remaining concrete piers exhibit conical fractures, identical with those of monolithic concrete.

waterproof qualities than obtained in common brick, as the atmospheric conditions in Portland are such that considerable trouble is found in all buildings because of dampness.

The results we have obtained have been highly satisfactory and we should not hesitate to use this product in the future in case the opportunity arises.

WELLS BROTHERS CONSTRUCTION CO.
By P. A. Wells.

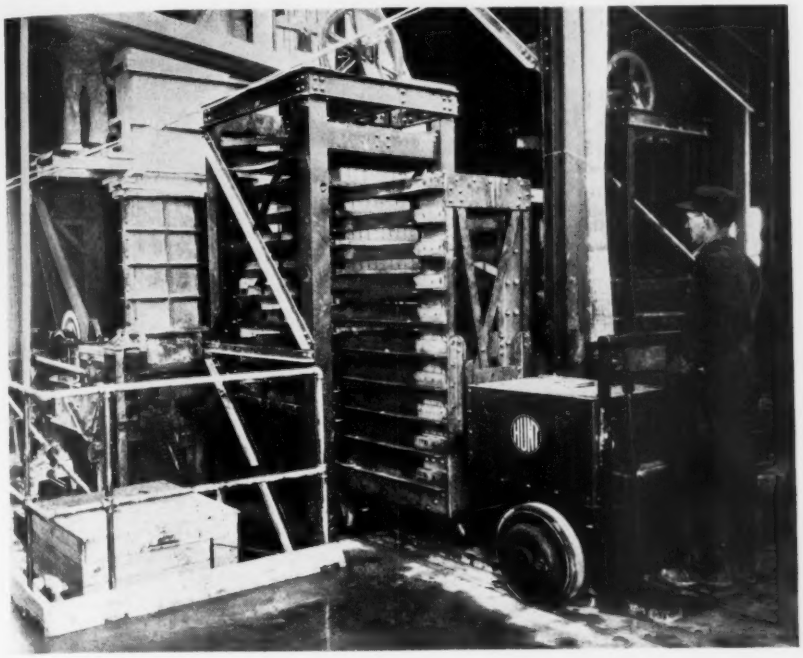

Fig. 5—Brick machine, brick accumulator and transfer truck in a modern concrete brick plant

Technical Facts About Concrete Brick

Brick is ordinarily judged as to quality by means of compression and absorption tests. Concrete brick compare favorably with clay brick as to load-bearing ability of individual units, and due to uniformity of manufacturing methods, compressive tests on several concrete bricks of the same lot invariably show close similarity as regards strength and other characteristics that can be reasonably expected of the kiln run of common clay brick.

The strength of brick masonry is obviously dependant on three factors: (1) The strength of individual bricks used in the masonry; (2) the strength of the mortar, and (3) the tenacity with which the mortar holds to the brick. One of the most significant facts regarding concrete brick is that they have the ability to develop a much stronger bond with the mortar than have the clay brick. Then if clay brick and concrete brick piers are laid up under identical conditions, and with identical mortar, the concrete brick pier will soon become much the stronger; or for masonry of equal strength, much weaker concrete brick may be used than clay brick.

This fact was very strikingly brought out in a recent series of tests made at Columbia University on concrete brick manufactured by the Brooklyn Crozite Brick Corp. (shown

Fig. 6—Placing concrete brick in curing chambers where they are allowed to harden in a moist atmosphere for 48 hr.

on page 16).

The following table shows the results of absorption tests made on concrete and on clay brick at the same time:

TOTAL ABSORPTION IN PER CENT OF DRY WEIGHT OF CONCRETE BRICK AND CLAY BRICK

	Per cent
Milwaukee "Cream" common	31.9
Chicago "Select" common	23.46
Hendricks medium hard	19.62
Hendricks "Salmon"	19.15
E. N. Wrenn common	17.91
Hudson River common	15.98
Tapestry face	7.52
Tapestry face	3.92

Concrete: Concrete common from 4 to 10.81 per cent, depending on mix.

As a result of the Columbia University finding concrete brick are recognized by the New York building department on a par with the clay product; they enjoy the same insurance rates, and the concrete brick have found ready sale in large quantities throughout Greater New York and vicinity.

To give an idea of the strength of concrete common brick in practice, it may be said the average of 48 random specimens recently tested in compression at Lewis Institute was 1685 lb. to the square inch. One specimen tested 4490 lb., while the lowest tested gave a result of 820 lb.

What do Bricklayers Think of Concrete Brick?

Earlier concrete brick were often made excessively hard and dense on the supposition that strength and watertightness required it. Such brick were naturally harder to cut and slower to lay, owing to the hardness and lack of suction. Modern practice in concrete brick manufacture demands brick that produce masonry at least as strong as clay masonry; that may be broken as easily as clay brick, and that has a satisfactory amount of suction. Concrete brick manufacturers not only find it possible to

comply with these requirements, but in addition they are able to closely control and keep uniform the amount of suction, without increasing the absorption to anywhere near the percentages often reached by apparently satisfactory clay brick.

The characteristics of modern concrete brick have been determined with regard not only to their structural fitness but having in mind ease and speed of laying as well, with the result that bricklayers have no objection to laying them after a few hours' experience.

Cost of Making Concrete Brick

The accompanying estimate of the cost of making concrete brick will be chiefly useful in providing a list of the factors determining the cost of manufacture. The estimate is not given with the idea of stating the cost, or any element thereof, definitely. These figures vary in different communities sometimes almost from day to day. The costs used closely approximate those prevailing in the vicinity of New York, Philadelphia, and Baltimore in 1922.

Using well-graded aggregate, ⅜-in. and down, the cement content provided for will produce a brick strength of about 2000 lb. per square inch.

A plant of the approximate capacity thus detailed seems to approach maximum efficiency with present methods and operating equipment. Were the output of this plant doubled or tripled, practically the same unit costs would obtain per thousand brick of output. A small saving would be realized in the items of manufacturing expense and general expense, but not enough difference would be made to appreciably lower the cost of manufacture. A smaller machine rated at 30,000 per day and producing about 5,000,000 to 7,000,000 brick per annum would cost proportionately less to install but operating costs might work out as much as $1 per thousand higher. Unless a plant is established making other concrete products it is recommended that concrete common brick be produced at the rate of not less than 25,000 per day.

In the manufacture of concrete brick it is essential that every detail of production routine should be directed to obtaining maximum efficiency of the portland cement content. The cost of the cement is nearly equal to the combined cost of all other manufacturing expense. This makes it doubly important that only well-graded, clean aggregate and sufficient mixing water should be used and that the product should be carefully cured.

Available Equipment for Making Concrete Brick

The following list of brick machinery now available and in use shows that there is a wide variation in the capacity of equipment offered. For installations in the smaller centers, the smaller types of machines have been used quite generally with good results,

SUMMARY OF COMPRESSION TESTS UPON CONCRETE AND CLAY BRICK AND PIERS

Concrete brick piers series A-18:	
Average compressive strength of bricks	1853 lb. per sq. in.
Average modulus of rupture of bricks	437 lb. per sq. in.
Average compressive strength of mortar	2099 lb. per sq. in.
Average compressive strength of pier	1348 lb. per sq. in.
Ratio of strength of piers to transverse strength of bricks	3.09
Ratio of strength of pier to compressive strength of bricks	.728*
Average absorption per cent of dry weight	10.81
Concrete brick piers series B-20:	
Average compressive strength of bricks	3446 lb. per sq. in.
Average modulus of rupture of bricks	638 lb. per sq. in.
Average compressive strength of mortar	2442 lb. per sq. in.
Average compressive strength of pier	1840 lb. per sq. in.
Ratio of strength of piers to transverse strength of bricks	2.98
Ratio of strength of pier to compressive strength of bricks	.534
Average absorption per cent of dry weight	9.26
Clay brick piers series C:	
Average compressive strength of bricks	2819 lb. per sq. in.
Average modulus of rupture of bricks	746 lb. per sq. in.
Average compressive strength of mortar	2119 lb. per sq. in.
Average compressive strength of pier	695 lb. per sq. in.
Ratio of strength of pier to transverse strength of bricks	.932*
Ratio of strength of pier to compressive strength of bricks	.247*

*Exclusive of results obtained on clay brick pier laid up without previously wetting the bricks.

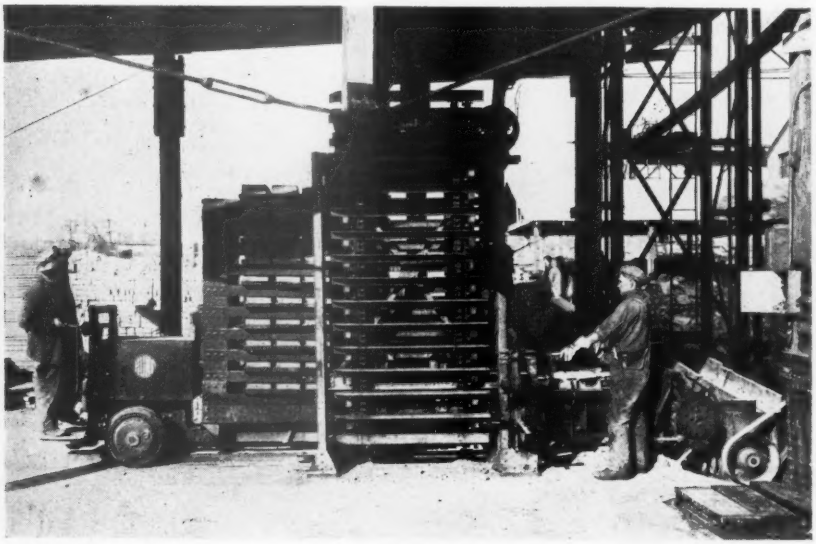

Fig. 7—Concrete brick entering the unstacker from which they go into the stock piles, while the pallets are automatically cleaned and returned

COST OF MANUFACTURING

45,000 brick per 10-hr. day. Size standard 3¾x2½x8 in. Mix 1 to 6

250 operating days per year

7 sacks per 1000		Cost per day's run	Cost per 1000 units
Cement—315 sacks at 70 cents		$220.50	$ 4.90
Aggregate—72.5 cu. yd. at $2.00		145.00	3.22
Direct labor—1 operator at $6.50	$ 6.50		
2 off bearers at $6.50	13.00		
1 aggregate man, 1 pallet feeder, 1 car man—3 hlprs. at $6.50	19.50		
4 yard men at $6.50	26.00		
1 mixer man at $7.00	7.00		
2 firemen at $6.50	13.00		
1 foreman at $10.00	10.00		
Daily labor		95.00	2.11
Manufacturing expense (per day)			
Liability insurance 4 per cent	3.80		
Water	1.00		
Fuel (curing and heating)	10.00		
Power and light	2.50		
Repairs to equipment	4.00		
Breakage			
Miscellaneous	5.00		
General expense		26.30	.58
	Year		
Depreciation and obsolescence—Equip. 20 per cent of $21,525	$ 4,300		
Buildings 5 per cent of $9,500	475		
Interest on investment 7 per cent of $51,000	3,570		
Taxes and insurance	1,500		
Land rental assumed 6 per cent on $10,000	600		
Total overhead per year	$10,445		
Total overhead per operating day		41.78	.93
Total daily cost		$528.58	
Total yard cost of 1000 brick			$11.74

To this cost must be added selling expense, delivery cost and profit to determine selling cost.

CONCRETE BRICK MANUFACTURE

45,000 Common Brick Per 10-Hr. Day—Machinery Schedule

Machine	$12,000	Building	$2,000
7,500 pallets at 50 cents each	3,750	Curing rooms	2,500
Cars and track or lift trucks and racks	2,000	Material bins	2,500
Mixer	700	Curing equipment, including boiler and pipe	1,500
Motor	500	Contingent	1,000
Shafting, belts, etc.	200		$9,500
Screen and mat. conveyor	900		
Installation	500		
Tools	100		
Freight on machine and mixer	125		
Miscellaneous	725		
Total mechanical equipment	$21,500		
Total building investment	9,500		
Total plant investment			$31,000
Additional operating capital			20,000
Total capital investment			$51,000

but where it is proposed to compete for business in the large and substantial markets, heavy duty, large capacity machines should be chosen:

1. **Anchor**—Anchor Concrete Machinery Co., Columbus, Ohio. Power tamping type. Each machine unit will produce about 10,000 brick per day.

2. **Besser**—Besser Sales Co., Monadnock building, Chicago. Power tamping type. This machine is made in two sizes, with rated capacities of 30,000 and 60,000 brick per 10-hr. day.

3. **Crozite.** Crozier-Straub, Inc., 140 West Forty-Second street, New York. Pres-

Fig. 8—Stockpile of the Brooklyn Crozite Brick Corp., showing quick-loading facilities

Fig. 9—A typical example of a New York apartment building in which concrete face and common brick were used exclusively

Fig. 10—Concrete common brick are used for side walls of hundreds of New York residences because they reflect light into courtways, yet never require painting

Fig. 11—Sample concrete face brick in the office of the Shope Brick Co., Portland, Ore.

face brick, and if equipped with power-tamping outfit for common brick purposes, will produce output comparable with the Anchor and Peerless equipment.

9. **Wert**—Wert Mfg. Co., Chicago, Power-tamping type. Capacity 15,000 brick per day.

10. **Zagelmeyer**—Zagelmeyer Cast Stone Block Machinery Co., Bay City, Mich. Wet process. The equipment consists of substantial steel gang molds; each mold casts 400 brick at a time. They are carried to curing chambers and stockpile on roller-bearing cars.

General Sales Conditions

Leading clay-brick producers seem to sell their product direct to contractors rather than through dealers. Some brick manufacturers have trade connections with building-material dealers within their competitive shipping territory, but these dealers as a general thing do not carry a large stock and requirements of any consequence generally seem to be purchased direct from the brick producer.

The objections of masons have been over-

Fig. 12—Home in Dallas, Texas. Example of gray concrete Shope face brick, made by the Shope process

Fig. 13—An attractive example of concrete brick for store building

sure wet-molding type. Heavy-duty machines with daily capacity of 25,000 brick and upward.

4. **Debay**—The Debay Research and Manufacturing Co., Springdale, Pa. Pressure type. The Debay is a new machine probably warranting investigation, but it is not now known to be in use in any plant.

5. **Helm**—Helm Brick Machinery Co., Cadillac, Mich. Manufactures various sizes of brick machines for hand and power operation, operating on the pressure principle. The same machines are adjustable to the manufacture of concrete block.

6. **Ideal**—Ideal Concrete Machinery Co., Cincinnati, Ohio. Power tamping type, producing between 10,000 and 20,000 brick per day.

7. **Peerless**—Peerless Brick Machine Co., New York. Very similar to the Anchor, already mentioned. Perhaps more Peerless machines than any other kind are in use in the small-capacity plants throughout the country.

8. **Shope**—Shope Brick Co., Portland, Ore. The Shope machine is of the hand-tamped type and without power-tamping equipment is of limited capacity. It is particularly well suited to the manufacture of

Fig. 14—Bungalow and pergola of buff concrete face brick, tapestry texture.

Fig. 15—Duplex apartments at Germantown, near Philadelphia, with walls of concrete brick

come without great difficulty in those communities where concrete brick are produced on a sufficiently large scale to permit the general run of mechanics to become familiar with them. Good salesmanship will convince owners and contractors that they will get a better-looking, stronger wall with concrete brick. Organized labor may offer trouble to brick manufacturers operating an open shop, but ordinarily this point is not raised.

Deliveries of brick to the job are generally made by the brick manufacturer in his own trucks. For this purpose heavy trucks up to 10 tons capacity are used, mounting special bodies designed to dump close to the street or on a brick pile with a minimum drop. A truck usually carries about 3000 brick per load.

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New Louisiana Shell Crusher for Making Poultry Grits

THE Gulf Crushing Co., to be capitalized at $100,000, is being organized at Morgan City, La., to operate a poultry grit factory. A marine plant is to be installed in Cote Blanche, the repository of the supply of reef shells, and the factory will be located on the river front. The reef oyster shell is also to be converted to other commercial uses, such as fertilizer, lime, road material and ballast. The company will begin operations some time in the fall.

Doullot & Williams of New Orleans, large contractors, are said to be the sponsors of the new company. It is estimated that the company will spend $100,000 yearly in pay rolls and supplies in this section. The marine plant will be of a capacity of 1000 yd. a day and the grinding plant will have an output of 175 tons per day. The marine equipment will be sufficient to provide about 650 yd. of raw material per day for highway construction, railroad ballast, etc.

Many new features have been worked out for the plant by John Scott, chief engineer, aided by the engineers of Doullot & Williams of New Orleans and the Allis-Chalmers Co. The support of Doullot & Williams as the largest stockholders in the enterprise assures efficient management and operation.

Albert Mead, who is identified with the enterprise, acquired a lease in 1914 from the state on the shell deposits at Point au fer Reef and organized the first successful shell crushing plant at Berwick, La., which plant has been in operation now for nearly two years. This plant has developed into one of much importance in the production of crushed shell for poultry in the United States. People in this section are taking considerable interest in the new industry and a small portion only of the $100,000 of stock remains unsubscribed.

With the great bodies of reef oyster shell under lease to the Gulf Crushing Co. in Cote Blanche, and to the Oyster Products Co. of Berwick, La., on Point au fer Reef, the industry will be in position for wide expansion.

Five Years' Cement Shipments and Consumption Per Capita

THE Portland Cement Association has published a report showing the shipments of portland cement into each state in 1918, 1919, 1920, 1921 and 1922, and giving the consumption per capita.

This consumption is shown by states and geological groups and by states, and the tables also show each state's percentage of the whole. The accompanying tabulations are reproduced from this report.

Consumption in the Eastern states between 1918 and 1922 increased 64 per cent, or from 22,963,000 to 37,688,000 bbl., according to a study which has just been made by the Cement Information Service. The greatest increase during this period occurred in New York state, where shipments grew from 6,335,000 bbl. in 1918 to 13,212,000 in 1922, or an increase of 109 per cent. The next largest increase occurred in Vermont, where consumption increased 90 per cent between 1918 and 1922, or from 122,000 bbl. in 1918 to 232,000 bbl. in 1922. Maine showed an increase of 80 per cent, from 247,000 to 446,000 bbl.

In New Jersey the consumption rose from 2,909,000 to 4,982,000 bbl., an increase of 71 per cent. Figures for Pennsylvania also show a decided increase, consumption going from 6,606,000 bbl. in 1918 to 10,343,000 in 1922, or a jump of 57 per cent. New Hampshire increased her consumption from 223,000 to 370,000 bbl., or 66 per cent; Delaware, from 269,000 in 1918 to 365,000 in 1922, or 36 per cent; Maryland, from 1,459,000 to 1,560,000, or 7 per cent; Massachusetts, from 2,236,000 to 3,000,000, or 34 per cent; Rhode Island, from 344,000 to 446,000, or 29 per cent; West Virginia, from 1,277,000 to 1,479,000, or 16 per cent, and Connecticut, from 936,000 to 1,253,000, an increase of 34 per cent.

The largest per capita consumption of cement throughout the Eastern states in 1922 occurred in Delaware, where 1.60 bbl. per person were used; in New York the consumption per capita in 1922 was 1.23 bbl.; in New Jersey, 1.50 bbl., and in Pennsylvania, 1.15 bbl. More than 11 per cent of all the portland cement consumed in the country in 1922 was used in New York state.

Shipments of Portland Cement by States and Consumption per Capita

	Shipments into States Barrels (Even Thousands)					*Consumption per Capita Barrels*				
	1918	*1919*	*1920*	*1921*	*1922*	*1918*	*1919*	*1920*	*1921*	*1922*
Alabama	840,000	577,000	770,000	605,000	993,000	.35	.24	.32	.25	.41
Arizona	296,000	366,000*	645,000	515,000	649,000	1.09	1.31	1.86	1.43	1.76
Arkansas	285,000	437,000	530,000	605,000	498,000	.16	.24	.30	.34	.28
California	3,569,000	3,837,000*	5,833,000	6,173,000	8,091,000*	1.14	1.20	1.65	1.69	2.19
Colorado	583,000	679,000	883,000	803,000	1,087,000	.57	.65	.93	.83	1.11
Connecticut	936,000	1,273,000	1,328,000	1,044,000	1,253,000*	.73	.97	.94	.73	.86
Delaware	269,000	290,000	302,000	313,000	365,000*	1.24	1.32	1.34	1.38	1.60
District of Columbia	611,000	408,000	358,000	446,000	655,000*	1.63	1.07	.82	1.02	1.50
Florida	363,000	506,000	555,000	664,000	915,000	.39	.53	.56	.66	.89
Georgia	708,000	1,041,000	1,209,000	882,000	1,061,000	.24	.35	.41	.30	.36
Idaho	233,000	297,000*	367,000	245,000	258,000	.50	.62	.83	.54	.56
Illinois	5,049,000	6,159,000	7,407,000	6,367,000	9,649,000	.80	.96	1.13	.96	1.44
Indiana	2,503,000	3,134,000	2,935,000	3,397,000	3,887,000	.88	1.09	.99	1.14	1.30
Iowa	2,334,000	3,402,000	3,360,000	3,118,000	3,234,000	1.05	1.53	1.39	1.28	1.32
Kansas	1,418,000	1,857,000	2,341,000	2,292,000	2,680,000	.76	.98	1.32	1.28	1.50
Kentucky	630,000	770,000	880,000	1,011,000	1,162,000	.26	.32	.36	.41	.47
Louisiana	588,000	578,000	836,000	682,000	893,000	.31	.30	.46	.37	.49
Maine	247,000	342,000	393,000	400,000	446,000*	.32	.43	.51	.52	.57
Maryland	1,459,000	1,368,000	1,327,000	1,394,000	1,560,000*	1.05	.98	.91	.94	1.05
Massachusetts	2,236,000	2,310,000	2,650,000	2,164,000	3,000,000*	.58	.59	.68	.55	.75
Michigan	3,244,000	5,013,000	5,143,000	6,113,000	6,187,000	1.04	1.58	1.37	1.59	1.59
Minnesota	2,202,000	3,002,000	3,109,000	3,091,000	3,544,000	.94	1.26	1.29	1.26	1.44
Mississippi	165,000	257,000	263,000	378,000	415,000	.08	.13	.15	.21	.23
Missouri	1,644,000	2,209,000	2,525,000	2,236,000	3,006,000	.48	.64	.74	.65	.88
Montana	367,000	456,000	404,000	309,000	266,000	.76	.91	.71	.53	.45
Nebraska	1,072,000	1,451,000	1,575,000	1,050,000	1,645,000	.83	1.11	1.21	.80	1.24
Nevada	34,000	50,000	98,000	84,000	91,000	.30	.42	1.26	1.09	1.18
New Hampshire	223,000	321,000	336,000	348,000	370,000*	.50	.72	.76	.78	.83
New Jersey	2,909,000	3,160,000	3,640,000	3,723,000	4,982,000*	.94	1.00	1.13	1.13	1.50
New Mexico	135,000	132,000	202,000	189,000	269,000	.31	.29	.55	.51	.73
New York	6,335,000	7,317,000	8,663,000	10,302,000	13,212,000*	.60	.68	.82	.97	1.23
North Carolina	644,000	774,000	994,000	1,172,000	2,278,000	.26	.31	.38	.45	.86
North Dakota	272,000	352,000	252,000	250,000	287,000	.34	.43	.38	.38	.43
Ohio	4,861,000	6,415,000	6,331,000	6,738,000	7,574,000*	.92	1.20	1.08	1.13	1.26
Oklahoma	1,067,000	1,322,000	1,688,000	1,656,000	2,010,000	.45	.54	.82	.79	.95
Oregon	323,000	642,000	795,000	825,000	972,000	.36	.70	1.00	1.02	1.20
Pennsylvania	6,606,000	7,717,000	8,582,000	9,269,000	10,343,000*	.75	.86	.97	1.04	1.15
Rhode Island	344,000	454,000	359,000	342,000	446,000*	.54	.70	.59	.55	.72
South Carolina	710,000	531,000	588,000	474,000	628,000	.43	.32	.35	.28	.36
South Dakota	419,000	713,000	588,000	472,000	507,000	.57	.95	.92	.73	.78
Tennessee	938,000	767,000	925,000	827,000	869,000	.40	.33	.39	.35	.37
Texas	1,543,000	1,980,000	2,450,000	2,303,000	2,879,000	.34	.42	.52	.48	.59
Utah	319,000	412,000*	649,000	443,000	451,000	.70	.89	1.42	.95	.96
Vermont	122,000	174,000	217,000	209,000	232,000*	.33	.52	.62	.59	.66
Virginia	2,054,000	1,477,000	1,369,000	1,322,000	1,431,000*	.92	.65	.59	.56	.60
Washington	1,043,000	1,277,000	1,834,000	1,483,000	1,745,000	.63	.74	1.33	1.06	1.24
West Virginia	1,277,000	1,089,000	1,220,000	1,350,000	1,479,000*	.89	.74	.82	.89	.97
Wisconsin	2,212,000	3,274,000	3,485,000	3,849,000	4,580,000	.87	1.27	1.31	1.43	1.69
Wyoming	187,000	301,000	337,000	286,000	229,000	.98	1.54	1.69	1.40	1.11
	68,428,000	82,670,000	93,530,000	94,213,000	115,263,000	.65	.77	.87	.87	1.06
Outside of U. S.	2,469,000	2,935,000	2,763,000	1,221,000	1,300,000					
Totals	70,897,000	85,605,000	96,293,000	95,434,000	116,563,000					

In figuring the consumption per capita for 1918, 1919, 1920, 1921 and 1922, the Bureau of the Census data on population for each year are used in order to give a consistent comparison. The figures shown for 1920 and 1921 are those published by the U. S. Geological Survey.

*Partially estimated

Consumption of Portland Cement by States and Geographical Groups

	1918	1919	1920	1921	1922	1922 over or Under 1921
Group A—New England						
Maine	247,000	342,000	393,000	400,000	446,000*	+12%
New Hampshire	223,000	321,000	336,000	348,000	370,000*	+ 6%
Vermont	122,000	174,000	217,000	209,000	232,000*	+11%
Massachusetts	2,236,000	2,310,000	2,650,000	2,164,000	3,000,000*	+39%
Rhode Island	344,000	454,000	359,000	342,000	446,000*	+30%
Connecticut	936,000	1,273,000	1,328,000	1,044,000	1,253,000*	+20%
Totals	4,108,000	4,874,000	5,283,000	4,507,000	5,747,000	+28%
Group B—Southern—East of Mississippi						
Virginia	2,054,000	1,477,000	1,369,000	1,322,000	1,431,000*	+ 8%
North Carolina	644,000	774,000	994,000	1,172,000	2,278,000	+94%
South Carolina	710,000	531,000	588,000	474,000	628,000	+32%
Georgia	708,000	1,041,000	1,209,000	882,000	1,061,000	+20%
Florida	363,000	506,000	555,000	664,000	915,000	+38%
Alabama	840,000	577,000	770,000	605,000	993,000	+64%
Mississippi	165,000	257,000	263,000	378,000	415,000	+10%
Kentucky	630,000	770,000	880,000	1,011,000	1,162,000	+15%
Tennessee	938,000	767,000	925,000	827,000	869,000	+ 5%
Totals	7,052,000	6,700,000	7,553,000	7,335,000	9,752,000	+33%
Group C—Middle Atlantic						
New York	6,335,000	7,317,000	8,663,000	10,302,000	13,212,000*	+28%
New Jersey	2,909,000	3,160,000	3,640,000	3,723,000	4,982,000*	+34%
Pennsylvania	6,606,000	7,717,000	8,582,000	9,269,000	10,343,000*	+12%
Delaware	269,000	290,000	302,000	313,000	365,000*	+17%
Maryland	1,459,000	1,368,000	1,327,000	1,394,000	1,560,000*	+12%
District of Columbia	611,000	408,000	358,000	446,000	655,000*	+47%
Totals	18,189,000	20,260,000	22,872,000	25,447,000	31,117,000	+22%
Group D—Middle Western						
West Virginia	1,277,000	1,089,000	1,220,000	1,350,000	1,479,000*	+10%
Ohio	4,861,000	6,415,000	6,331,000	6,738,000	7,574,000*	+12%
Indiana	2,503,000	3,134,000	2,935,000	3,397,000	3,887,000	+14%
Illinois	5,049,000	6,159,000	7,407,000	6,367,000	9,649,000	+52%
Michigan	3,244,000	5,013,000	5,143,000	6,113,000	6,187,000	+ 1%
Wisconsin	2,212,000	3,274,000	3,485,000	3,849,000	4,580,000	+19%
Missouri	1,644,000	2,209,000	2,525,000	2,236,000	3,006,000	+34%
Kansas	1,418,000	1,857,000	2,341,000	2,292,000	2,680,000	+17%
Nebraska	1,072,000	1,451,000	1,575,000	1,050,000	1,645,000	+57%
Iowa	2,334,000	3,402,000	3,360,000	3,118,000	3,234,000	+ 4%
Totals	25,614,000	34,003,000	36,322,000	36,510,000	43,921,000	+20%
Group E—Southern: West of Mississippi						
Louisiana	588,000	578,000	836,000	682,000	893,000	+31%
Arkansas	285,000	437,000	530,000	605,000	498,000	−18%
Totals	873,000	1,015,000	1,366,000	1,287,000	1,391,000	+ 8%
Group F—Northwestern						
Minnesota	2,202,000	3,002,000	3,109,000	3,091,000	3,544,000	+15%
North Dakota	272,000	352,000	252,000	250,000	287,000	+15%
South Dakota	419,000	713,000	588,000	472,000	507,000	+ 7%
Totals	2,893,000	4,067,000	3,949,000	3,813,000	4,338,000	+14%
Group G—Southwestern						
Texas	1,543,000	1,980,000	2,450,000	2,303,000	2,879,000	+25%
Oklahoma	1,067,000	1,322,000	1,688,000	1,656,000	2,010,000	+21%
New Mexico	135,000	132,000	202,000	189,000	269,000	+42%
Arizona	296,000	366,000*	645,000	515,000	649,000	+26%
Totals	3,041,000	3,800,000	4,985,000	4,663,000	5,807,000	+25%
Group H—Rocky Mountains						
Colorado	583,000	679,000	883,000	803,000	1,087,000	+35%
Utah	319,000	412,000*	649,000	443,000	451,000	+ 2%
Wyoming	187,000	301,000	337,000	286,000	229,000	−20%
Montana	367,000	456,000	404,000	309,000	266,000	−14%
Idaho	233,000	297,000*	367,000	245,000	258,000	+ 5%
Totals	1,689,000	2,145,000	2,640,000	2,086,000	2,291,000	+10%
Group I—Pacific Coast						
California	3,569,000	3,837,000*	5,833,000	6,173,000	8,091,000*	+31%
Washington	1,043,000	1,277,000	1,834,000	1,483,000	1,745,000	+18%
Oregon	323,000	642,000	795,000	825,000	972,000	+18%
Nevada	34,000	50,000	98,000	84,000	91,000	+ 8%
Totals	4,969,000	5,806,000	8,560,000	8,565,000	10,899,000	+27%

*Partially estimated.

Statement Showing Consumption of Portland Cement by States and Each State's per cent. of the whole. (These figures do not include Export Shipment)

	Barrels Even Thousands					*Per Cent*				
	1918	*1919*	*1920*	*1921*	*1922*	*1918*	*1919*	*1920*	*1921*	*1922*
Alabama	840,000	577,000	770,000	605,000	993,000	1.23	.70	.82	.64	.86
Arizona	296,000	366,000*	645,000	515,000	649,000	.43	.44	.69	.55	.56
Arkansas	285,000	437,000	530,000	605,000	498,000	.42	.52	.57	.64	.43
California	3,569,000	3,837,000*	5,833,000	6,173,000	8,091,000*	5.22	4.64	6.24	6.54	7.02
Colorado	583,000	679,000	883,000	803,000	1,087,000	.85	.82	.94	.85	.94
Connecticut	936,000	1,273,000	1,328,000	1,044,000	1,253,000*	1.37	1.54	1.42	1.11	1.09
Delaware	269,000	290,000	302,000	313,000	365,000*	.39	.35	.32	.33	.32
Dist. of Col.	611,000	408,000	358,000	446,000	655,000*	.89	.49	.38	.47	.57
Florida	363,000	506,000	555,000	664,000	915,000	.53	.61	.59	.70	.79
Georgia	708,000	1,041,000	1,209,000	882,000	1,061,000	1.03	1.26	1.29	.94	.92
Idaho	233,000	297,000*	367,000	245,000	258,000	.34	.36	.39	.26	.22
Illinois	5,049,000	6,159,000	7,407,000	6,367,000	9,649,000	7.38	7.47	7.92	6.76	8.38
Indiana	2,503,000	3,134,000	2,935,000	3,397,000	3,887,000	3.66	3.79	3.14	3.61	3.37
Iowa	2,334,000	3,402,000	3,360,000	3,118,000	3,234,000	3.41	4.12	3.59	3.31	2.81
Kansas	1,418,000	1,857,000	2,341,000	2,292,000	2,680,000	2.07	2.25	2.50	2.43	2.32
Kentucky	630,000	770,000	880,000	1,011,000	1,162,000	.92	.93	.94	1.07	1.01
Louisiana	588,000	578,000	836,000	682,000	893,000	.86	.70	.89	.72	.78
Maine	247,000	342,000	393,000	400,000	446,000*	.36	.41	.42	.42	.39
Maryland	1,459,000	1,368,000	1,327,000	1,394,000	1,560,000*	2.13	1.66	1.42	1.48	1.35
Massachusetts	2,236,000	2,310,000	2,650,000	2,164,000	3,000,000*	3.27	2.80	2.83	2.30	2.60
Michigan	3,244,000	5,013,000	5,143,000	6,113,000	6,187,000	4.74	6.06	5.50	6.50	5.37
Minnesota	2,202,000	3,002,000	3,109,000	3,091,000	3,544,000	3.22	3.63	3.32	3.28	3.08
Mississippi	165,000	257,000	263,000	378,000	415,000	.24	.31	.28	.40	.36
Missouri	1,644,000	2,209,000	2,525,000	2,236,000	3,006,000	2.40	2.67	2.70	2.37	2.61
Montana	367,000	456,000	404,000	309,000	266,000	.54	.55	.43	.33	.23
Nebraska	1,072,000	1,451,000	1,575,000	1,050,000	1,645,000	1.57	1.75	1.68	1.11	1.43
Nevada	34,000	50,000	98,000	84,000	91,000	.05	.06	.11	.09	.08
New Hampshire	223,000	321,000	336,000	348,000	370,000*	.33	.39	.36	.37	.32
New Jersey	2,909,000	3,160,000	3,640,000	3,723,000	4,982,000*	4.25	3.82	3.89	3.96	4.32
New Mexico	135,000	132,000	202,000	189,000	269,000	.20	.16	.22	.20	.24
New York	6,335,000	7,317,000	8,663,000	10,302,000	13,212,000*	9.25	8.84	9.26	10.94	11.45
North Carolina	644,000	774,000	994,000	1,172,000	2,278,000	.94	.94	1.06	1.24	1.98
North Dakota	272,000	352,000	252,000	250,000	287,000	.40	.43	.27	.27	.25
Ohio	4,861,000	6,415,000	6,331,000	6,738,000	7,574,000*	7.11	7.76	6.78	7.14	6.57
Oklahoma	1,067,000	1,322,000	1,688,000	1,656,000	2,010,000	1.56	1.60	1.81	1.76	1.74
Oregon	323,000	642,000	795,000	825,000	972,000	.47	.78	.85	.88	.84
Pennsylvania	6,606,000	7,717,000	8,582,000	9,269,000	10,343,000*	9.65	9.33	9.18	9.84	8.97
Rhode Island	344,000	454,000	359,000	342,000	446,000*	.50	.55	.38	.36	.39
South Carolina	710,000	531,000	588,000	474,000	628,000	1.04	.64	.63	.53	.55
South Dakota	419,000	713,000	588,000	472,000	507,000	.61	.86	.63	.51	.44
Tennessee	938,000	767,000	925,000	827,000	869,000	1.37	.93	.99	.88	.75
Texas	1,543,000	1,980,000	2,450,000	2,303,000	2,879,000	2.26	2.39	2.62	2.44	2.50
Utah	319,000	412,000*	649,000	443,000	451,000	.46	.50	.69	.47	.39
Vermont	122,000	174,000	217,000	209,000	232,000*	.18	.21	.23	.22	.20
Virginia	2,054,000	1,477,000	1,369,000	1,322,000	1,431,000*	3.00	1.79	1.46	1.40	1.24
Washington	1,043,000	1,277,000	1,834,000	1,483,000	1,745,000	1.52	1.55	1.96	1.57	1.52
West Virginia	1,277,000	1,089,000	1,220,000	1,350,000	1,479,000*	1.87	1.32	1.31	1.43	1.28
Wisconsin	2,212,000	3,274,000	3,485,000	3,849,000	4,580,000	3.24	3.96	3.74	4.08	3.97
Wyoming	187,000	301,000	337,000	286,000	229,000	.27	.36	.36	.30	.20
Totals	68,428,000	82,670,000	93,530,000	94,213,000	115,263,000	100.00	100.00	100.00	100.00	100.00

*Partially estimated.

A Study of Lime Kilns

I—Outline of a Series of Forthcoming Articles—Introductory—Discovery of Lime—Process of Manufacture

By Arthur E. Truesdell
Consulting Engineer, Pittsfield, Mass.

SOME years ago I tried to find some published and available information on lime kilns that was really intelligible and up-to-date. I purchased several books on cement, etc., but have never run across what I was looking for. Writers seem to regard the subject as too simple or of little importance for a detailed analysis. So I have decided to try my hand at the subject.

Correspondence and suggestions from readers will be welcome. It seems highly desirable at this advanced stage of the lime industry with a new and larger vision of the possibilities of lime to have a better understanding of the manufacture of lime, simple and crude as it may appear at first glance.

I have divided my subject according to the following outline which will be treated serially in this and succeeding issues of ROCK PRODUCTS:

Outline of Lime Manufacture

I. Introductory.
  - Discovery of lime.
  - Looking over the kilns.
  - The process of manufacture.

II. Raw materials.
  - Limestones.

III. Thermo-chemistry.
  - Energy of materials.
  - The calorimeter.
  - Finding the heat of chemical reactions.

IV. Kilns.
  - Kiln elements.
  - Principles of combustion.
  - Burning coal on a grate.
  - Adapting fuels for efficient combustion.
  - Heating by radiation.
  - Heating by conduction.
  - Heating chambers.
  - Draft.
  - Heating efficiency.

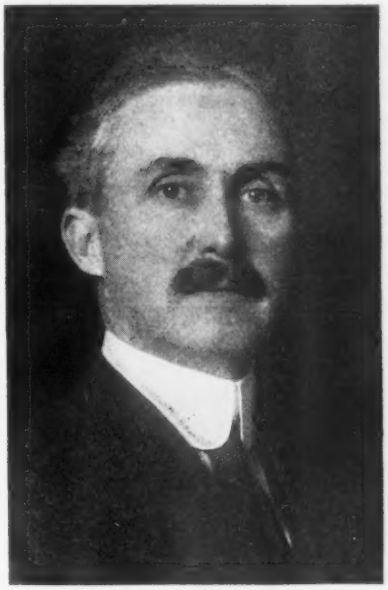
V. Heating limestones.
  - Sensible heating.
  - Potential heating.
  - Dissociating the carbonates.
  - Heating the impurities.
  - Heating soft stone.
  - Stone sizing affects heating.
  - Moderate temperatures required.
  - Uniform temperature desirable.
  - Steam, a help.
  - Quality of product.

VI. Lime kilns—Heating chambers and furnaces.
  - An energy transformer.
  - Vertical heating chambers.
  - Horizontal heating chambers.
  - Inclined heating chambers.
  - Most fuels available.
  - Fuels used and their combustion.
  - Modifying excessive temperatures.
  - Draft necessary in heating chamber.

VII. Lime kilns—Efficiency and economy.
  - Heating requirements of lime kilns.
  - Heat balance of the kiln.
  - Heat losses in dollars.
  - Wood vs. coal.
  - No control of heat.
  - High fuel consumption.
  - Ash.
  - Labor.
  - Fixed charges.
  - Summary of major requirements.

VIII. Lime kilns—Operating types.
  - Pot kilns.
  - Mixed feed vertical kilns.
  - "Patent" vertical kilns.
  - Hoffman kilns.
  - Tunnel kilns.
  - Rotary kilns.

IX. Summary.
  - Kiln design an art.
  - Valedictory—The broad outlook.



Arthur E. Truesdell

Editor's Introduction

ARTHUR E. TRUESDELL, the author of this series of articles, needs no further introduction to the readers of "Rock Products" who have read and saved his splendid article on "Lime Burning in the Rotary Kiln," published in our issue of March 25, 1922. It is a real pleasure and a genuine satisfaction to be able to present now to the lime industry a series of articles from his pen, which bids fair to become a standard work of reference on the manufacture of lime—something we know every lime manufacturer has devoutly wished for.—The Editor.

Discovery of Lime

In days so remote as to tax our imagination, it is probable that the plastic and hardening properties of slaked lime were discovered. It may be that some dweller in a log hut, whose crevices were stopped against wind and rain by dried mud, found one day some hardened, whitish substance among the stones with which he had builded a rude fireplace outside his hut to confine the fire and cook his simple meal. His interest aroused, it did not require many trials to learn that some stone about the fire was acted on in a curious way after being highly heated, and that if it rained soon after, the stone crumbled into a white plastic mud, which afterwards hardened in the air. Of course, if it was hard to get mud near by, of the proper quality to plaster up the cracks of his hut, our inventor used and encouraged his neighbors to use the new substance, which fortunately had the valuable property of drying harder when mixed with sand. This increased its usefulness immensely, as a small quantity would go much further. It was then discovered that the new material was more durable than most muds and so it was adopted universally

except where the finest muds were plentiful, the sun hot for drying, and limestone rare.

With increased demand it became necessary to find an easier way to get the lime, and so the rocks which had these curious properties were piled up in rude crevices in the ground, or confined in such a way that the heating would be more effective. Thus, naturally, the original pot kilns probably came into use, some of whose decendants are in use to this day in not very different form.

For very many years such a simple device for burning lime did not seem important enough to deserve much attention, as lime was cheap and plenty. Within perhaps the last 50 years, men who had received more or less scientific training perceived the chemical nature of the process; and, because of the rising prices of fuel, the necessity of more efficient kilns.

Looking Over the Kilns

Something over 20 years ago the writer, in order to familiarize himself with the technique of the business, took pains to visit as many lime plants as he could and endeavored to discover any "tricks of the trade" which would enable him to make a success of his business. He engaged in earnest conversation with everybody in sight and especially listened attentively to any advice of the older generation, some of whom never shaved and wore rubber boots the year around. One said (referring to his kiln) that he new "she" was making lime "when she had a nice purty blaze a playin' on top." Another declared that "she" mustn't smoke, as that was a sign of wasted fuel. Another wanted his firing doors open all the time. Still another wanted his closed. And so on. Quite a few considered large output a matter of luck. The tender was inclined to carry a rabbit's foot and pray for the wind to come from a particular direction.

An examination disclosed, of course, that conditions at the different plants varied widely as respects raw material, style of kiln, fuel used and method of operation. No two plants were getting the same results from an efficiency or cost standpoint, which same can be said today.

The Process of Manufacture

All manufacturers of lime and users of it for chemical purposes know it to be a more or less impure mixture of the oxides of calcium (CaO) and magnesium (MgO). While for some uses a high percentage of magnesium is desirable, the broader field is possibly for those limes which carry a high percentage of calcium. The special requirements of the various uses and their varying demand render an absolute statement in this respect hard to make. The chemical users are very insistent about the composition of the limes they use, while the builders care more for cubic feet of putty (wet hydrate) per dollar of cost. It is unfortunate that they see more in "spread" than in the strength of the finished materials. For a detailed view of very many uses of lime the reader is referred to an article by Holmes.*

The wide distribution in nature of the carbonates of calcium ($CaCO_3$) and magnesium ($MgCO_3$), generally associated together, and the simplicity of their transformation into the oxides by the application of heat have precluded the consideration of other materials and methods for securing the oxides, even though the resulting limes are impure. Our present process by heating the carbonates simply breaks up (dissociates) the chemical union and drives out the carbon dioxide (CO_2) in gaseous form, leaving the oxides. Expressing the chemical reactions due to the heating in the form of equations with the molecular weights involved we have:

For the calcium carbonate

calcium carbonate		calcium oxide		carbon dioxide	
$CaCO_3$	=	CaO	+	CO_2	(1)
100		56		44	

For the magnesium carbonate

magnesium carbonate		magnesium oxide		carbon dioxide	
$MgCO_3$	=	MgO	+	CO_2	(2)
84		40		44	

The weights given are relative and are true for any system whatever. They may be grains, pounds, grams or kilograms. But cannot be mixed. If we dissociate 100 tons of calcium carbonate, we always get 56 *tons* of calcium oxide, never 56 lb. or 56 kg.—and never more or less. If we dissociate other amounts we get proportional amounts of the products. For example, taking 50 pounds of calcium carbonate, we find the oxide therefrom to be

$$50 \times 56/100 = 28 \text{ lb.}$$

and the carbon dioxide driven off to be

$$50 \times 44/100 = 22 \text{ lb.}$$

Total products = 50 lb.
Original carbonate = 50 lb.

Thus we see the value of the molecular weights as they can be used in all chemical equations to determine unknown quantities from any one that is known and on any system of weights.

The process of heating while inefficient produces the cheapest source of alkali available in large quantities. So it is probable that for many years we shall use kilns in the manufacture of lime.

(To be continued)

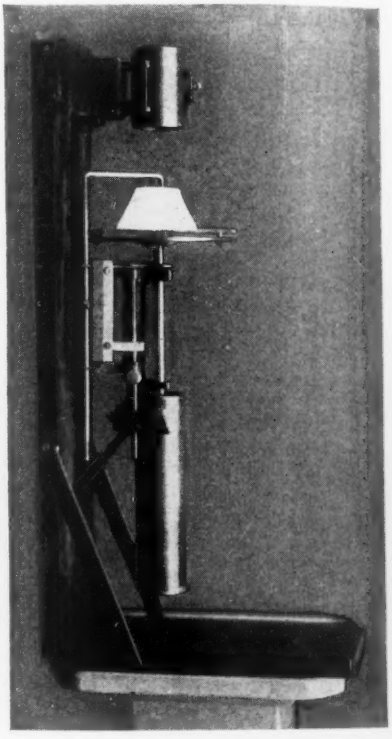
*Holmes, M. E.—An Outline of the Uses of Lime, Chem. & Met. Eng., Feb. 15, 1922.

Gypsum Industries Association's New Address

THE Gypsum Industries Association will move its offices on May 1 to the America Fore building, 844 Rush street, Chicago. This change will be made in order to provide additional office space to take care of the expansion of the association's business.

Further Details on New Plasticimeter

THE inadvertent dropping of two paragraphs from the article on page 47 of the April 7 issue of ROCK PRODUCTS, describing a new instrument for measuring the consistency and plasticity of cement, lime, gypsum, clay, etc, makes it necessary to add to that article the fact that Charles L. Rhodes, of Akron, N. Y., is the inventor of the device. Patents have been applied for and he has placed the instrument upon the market. An illustration showing the instrument in more detail is reproduced herewith.



A device which measures the consistency and plasticity of plastic materials

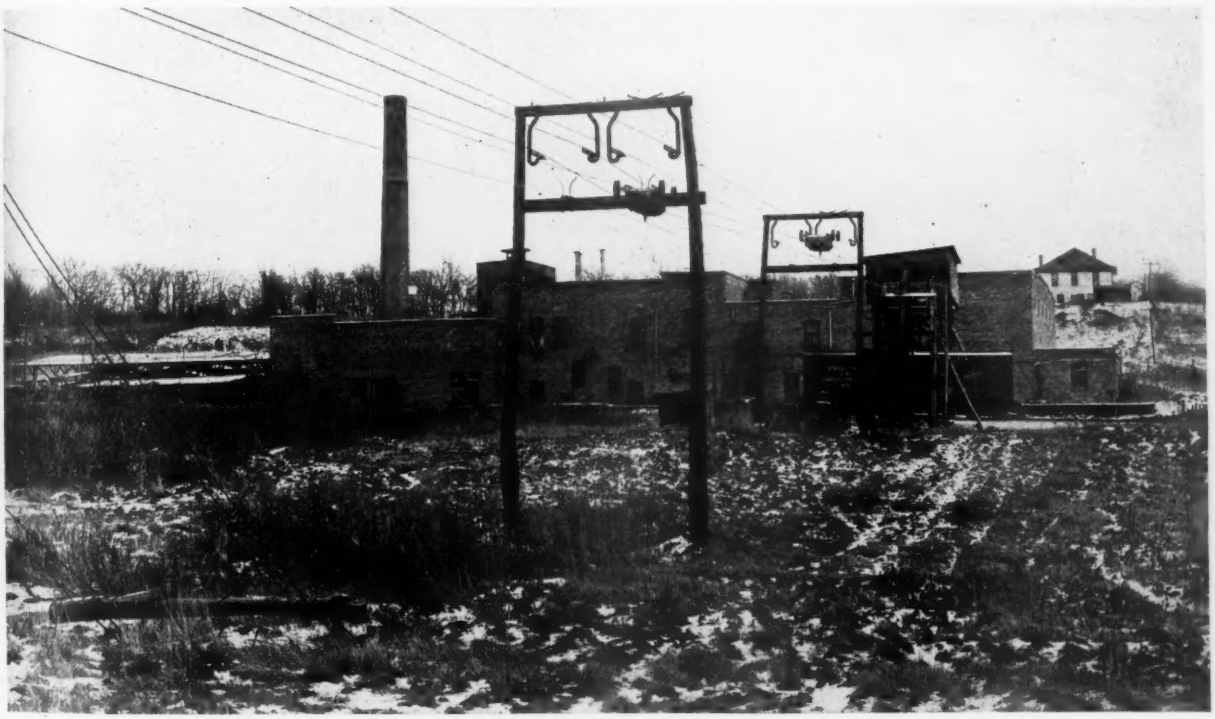
Cement Production for March

PRODUCTION of portland cement for March was unusually heavy for this season, the production being nearly 9,000,000 bbl., almost 2,000,000 bbl. more than last year at this time. For the quarter ending March 31, it was more than 35,000,000, compared with an average slightly over 17,000,000 for that quarter during the five-year period, 1919-1923.

Universal Gypsum Company Has Nation Wide Project

Now Owns Two Iowa Mills, Property in Texas and Ohio and Will Soon Have Mills in the East and in California

DURING the last few months a new gypsum products manufacturer—the Universal Gypsum Co., Chicago, Ill.—has been building up a property and organization which will make it a national factor in the gypsum industry. The new company was organized under a Delaware charter on December 11, 1922. It is capitalized at $4,000,000 of 7 per cent cumulative preferred stock and 125,000 shares of no par value common stock.



Iowana mill, Ft. Dodge, Iowa, of the Universal Gypsum Co.

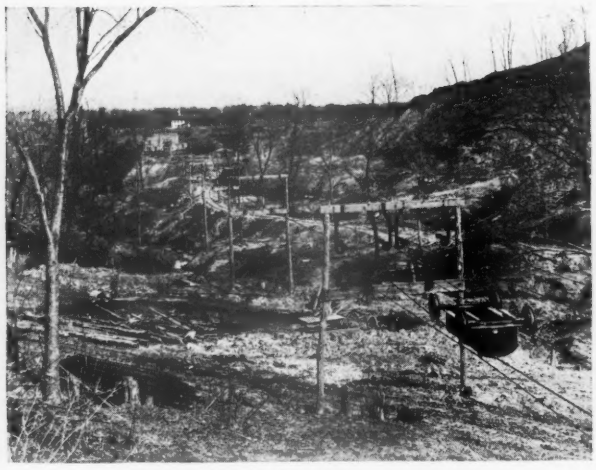
The promotors and officers of the new company are all men nationally known in the gypsum industry and to the building materials trade. The president, W. E. Shearer, is the former vice-president and general manager of the American Cement Plaster Co. Before that he was for 10 years with the United States Gypsum Co. as sales manager and as general sales manager and director. C. E. Williams, vice-president in charge of operations, was formerly general production manager of the American Cement Plaster Co. The general sales manager is John J. Gorman, who was until recently the general sales manager of the American Cement Plaster Co. J. A. Henley, treasurer, is one of the pioneers of the gypsum industry. For many years he was president of the American Cement Plaster Co. J. F. Haggerty, secretary, was formerly sales executive of the Sherwin-Williams Co., Cleveland, Ohio, and later vice-president of the Beaver Board Companies, Buffalo, N. Y. The division sales managers are Norman G. Hough, central sales manager, headquarters at Chicago, formerly with the American Cement Plaster Co., and before that manager of the Hydrated Lime Bureau at Pittsburgh, Pa., and Henry J. Osterlund, formerly sales manager of the Plymouth and Iowana Gypsum companies, who will continue as sales manager for the northwestern district with offices at Fort Dodge, Iowa.

The directors of the company, in addition to the officers named, are L. E. Armstrong, former president and general manager of the Plymouth Gypsum Co., Fort Dodge, Iowa; Oliver Mitchell, vice-president of the Thorkildsen-Mather Co., manufacturers of borax and boracic acid, Chicago; Martin A. Johnson, president and general manager of E. E. Barnard & Co., industrial insurance brokers, Chicago, and W. M. Stolz, former division sales manager of the American Cement Plaster Co.

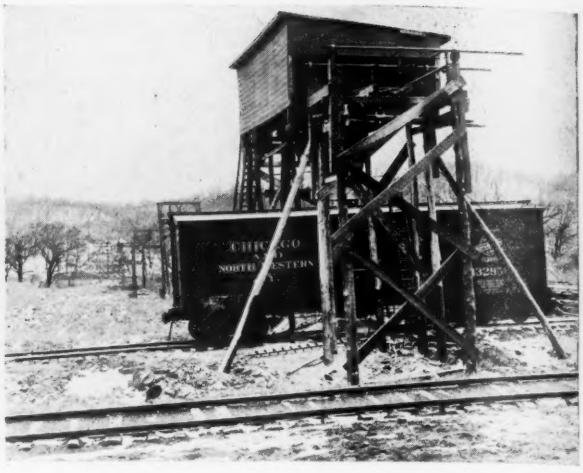
Properties

At Fort Dodge, Iowa, the properties of the Plymouth Gypsum Co. and the Iowana Gypsum Co. have been taken over. These two plants have a combined capacity of over 1000 tons a day. The two plants include an electrically-equipped mine with resources estimated at over 12,000,000 tons of gypsum rock, a wallboard and plaster-board plant, a gypsum-tile factory, a plaster retarder plant and a mortar color plant in addition to the two mills.

The Iowana plant is one the most up-to-date gypsum mills in this country. It



Cable tramway from mine to mill



Loading plant for crude gypsum

was completed only about two years ago. Most of the views herewith were taken by a member of the staff of Rock Products.

The crude gypsum rock is obtained at the same mine as is used by the Plymouth Gypsum Co. and is crushed at the same crushing plant; only one aerial tramway system delivers the material to the Plymouth mill while the other tramways, some 2000 ft. in length, deliver crushed gypsum rock to a storage bin at the Iowana mill.

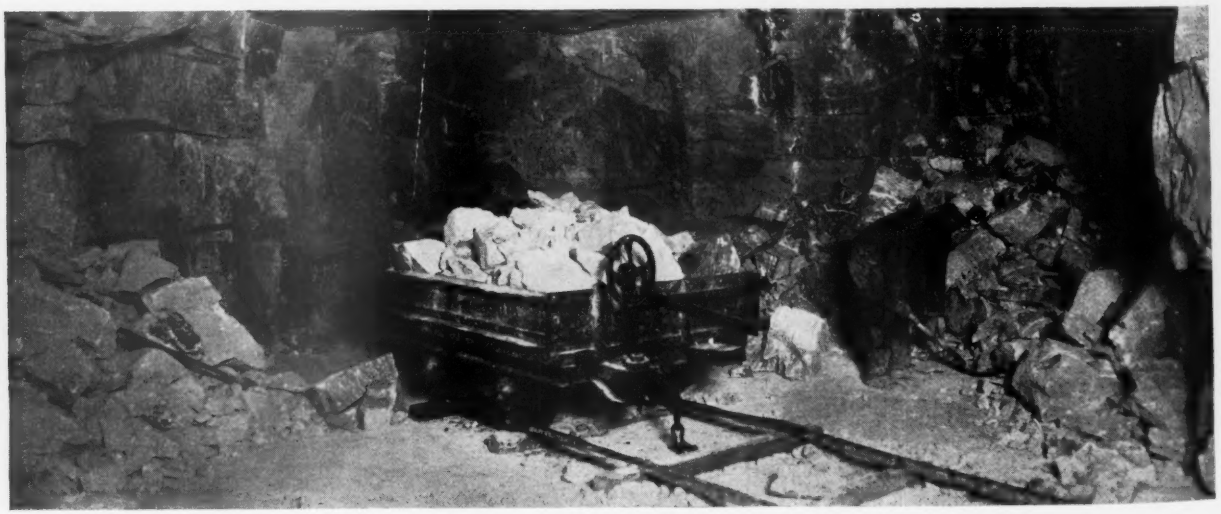
As the material is needed it is drawn out of the storage bin by a screw conveyor and fed into a 6x35 ft. Ruggles-Cole rotary drier. This drier is of the double-shell, direct-fired type and the gases of combustion do not come in direct contact with the raw gypsum rock, thus eliminating any possibility of discoloration in the rock. It is always the aim to keep the material as free from impurities as is possible. The drier has an inclination of ½ in. to the foot and the dried rock is discharged to an elevator boot where it is taken up by a bucket elevator and discharged to another storage bin. The bucket elevator is entirely enclosed in a concrete casing.

From the bin the dried rock is fed by gravity to a No. 3 Williams pulverizer, where it is reduced to a size suitable for calcination and discharged into a screw conveyor leading to a bucket elevator which deposits the material over two screws. The screws are set at an angle of 45 deg. and have slots ⅜ in. long by 1-16 in. wide, totally enclosed in a metal casing. A vibrating action is produced by a number of eccentrics operating off one shaft. These screws are of the company's own design and manufacture.

The fine material from the screws is delivered to a system of screw conveyors and elevators which discharges the finely-ground material to a bin over the kettles. This is known as the land plaster bin and has a capacity of approximately 400 tons. The rejections from the screws are returned for re-pulverization in the Williams mill.

Under the land plaster bin there are four calcining kettles, 10 ft. in diameter by 12 ft. high, with direct-fired furnaces. In order to prevent burning, the gypsum is kept constantly in motion by a gear-driven agitator, which consists of a long vertical shaft to which are attached chains and paddles. The gypsum is fed slowly from the bin through a loading door in the kettle. The agitator always tends to keep the material whirling toward the center of the shaft. When a temperature of 400 deg. has been reached the first settle has been completed and the hot gypsum (now plaster of paris) is discharged by gravity into the hot pit where it is allowed to cool. The time of calcination usually requires about 2 hr. All kettles are equipped with thermometers, both indicating and recording.

When the gypsum has cooled off it is drawn into screw conveyors which discharge to one cross-screw conveyor discharging to a bucket elevator which delivers the material to the hot stucco bin.



Interior of Ft. Dodge gypsum mine—part of the property of the Plymouth and Iowana mills of the Universal Gypsum Co.

Electric locomotive and train used in mining gypsum at Ft. Dodge, Iowa

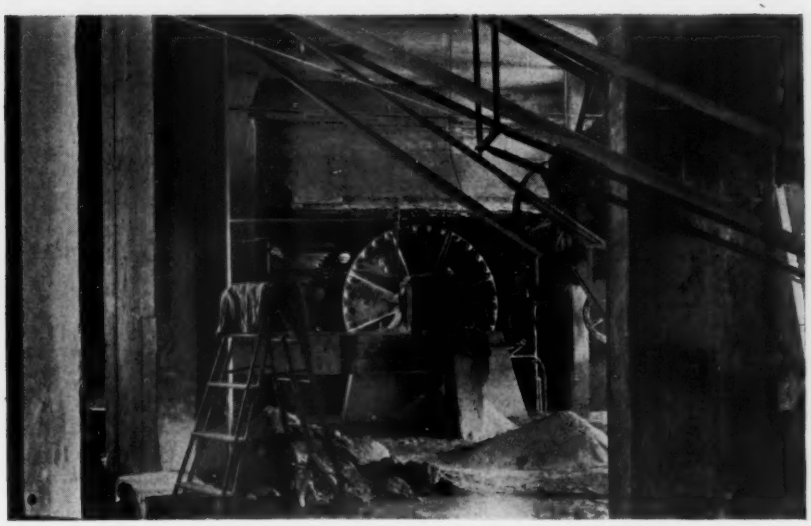
From here it is fed to either or both of two 5x22 ft. Allis-Chalmers ball mills. The ball mills are each run by a 100 hp. motor, respectively.

First Use of Ball Mills

The Iowana Plaster Co. is the first to use a ball mill for pulverizing stucco. It is claimed that the resultant product is not only considerably finer than that obtained by former methods but also that it retains about 2 per cent moisture, which makes it more plastic. Besides, the dust horror is obviated.

One of the first valve-bag packing machines installed in a gypsum plant

Gypsum deposit at Rotan, Texas



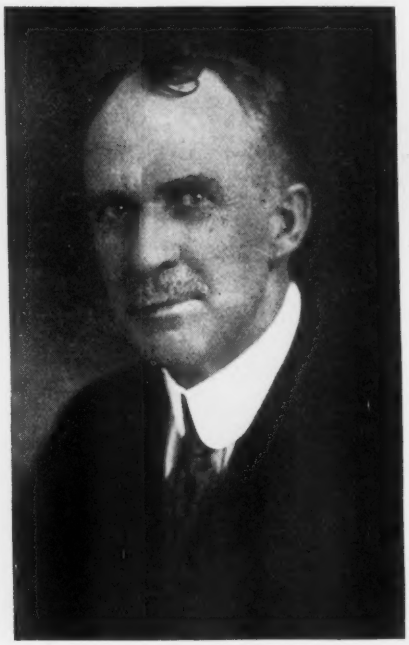
Ball mills for grinding gypsum—one of the first installations of its kind

C. E. Williams, vice-president

W. M. Stoltz, director

Both ball mills discharge to one screw conveyor and one bucket elevator which deposits the material to a bin above the mixing hoppers. At present there are two hoppers, one above a Broughton mixer feeding an open bag packer and one above a double set of Broughton mixers feeding a three-tube Bates valve-bag packer. At the hopper above, the necessary retarder and fibre are added to the plaster. The proportioning is done by weight and the charge is admitted to the mixers below from which it is packed.

This is also practically the first installation of a Bates valve-bag packer in a gypsum mill and the results obtained in greater speed and efficiency and the lessening of the dust horror have been remarkable. Also, no material is lost in the bagging operation as is usual with the old flow-type packers. From the bagging machines the finished plaster is either trucked direct to cars or to storage. The carloading track is directly opposite the bagging machines so that the trucking requires but a minimum of time and effort.



W. E. Shearer, president

Another view of Rotan deposit showing very slight (6 in.) overburden—an open-quarry proposition

John J. Gorman, general sales manager

Norman G. Hough, central sales manager

The plaster mill is electrically operated throughout and has a capacity of 500 tons of plaster per 24 hr. It is located on the Minneapolis & St. Louis railway and has storage capacity in its yard for 60 cars. This always insures a good car supply.

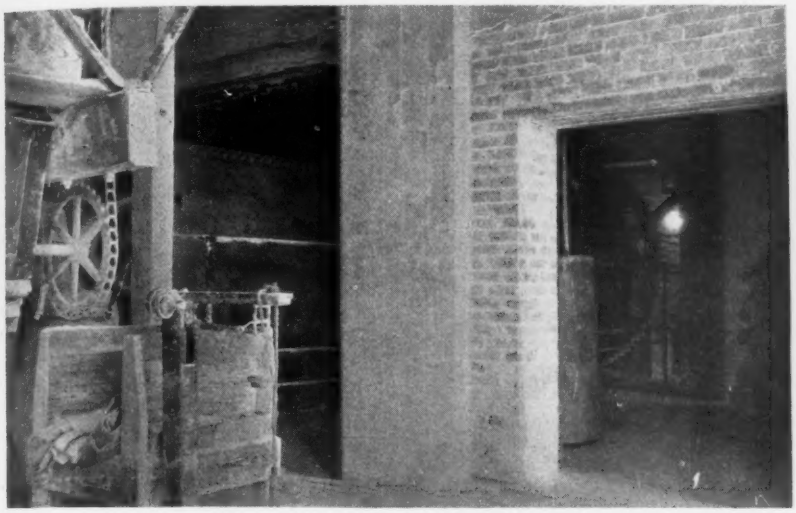
Other Properties

The deposit owned by the Universal Gypsum Co. at Rotan, Texas, is an unbroken, solid body and is regarded as the most extensive deposit of pure gypsite commercially located in the Southwest. Exhaustive tests show this deposit to be unusually free from impurities. The massive formation, uniform high-grade qual-

ity, accessibility and general character of the deposit insure a product of the highest quality at a low labor and manufacturing cost. This property contains over 460 acres and, based upon repeated surveys, the available gypsite is estimated at not less than 5,000,000 tons, or sufficient to operate the mill at its full yearly capacity of 100,000 tons for approximately 50 years. Plans for the development of this property are now under way.

The next step in the company's plans is to build a modern plant, of 600 tons daily capacity, for the manufacture of wall plaster, wall board and other gypsum products on property it controls near Port Clinton, Ohio.

The three plants which are to be added to the above properties—one in western New York and one each on the East and West coasts—are to be either acquired or constructed to complete the chain of six modern plants at strategic locations and will ultimately secure to the company complete national distribution of its products.



Another view of one of the tube mills

New Facts About Quick-Setting Cement

DURING the last meeting of the International Railway Congress at Rome, Italy, mention was made of the use of a quick-setting concrete known as "Ciment Fondu." This is a French cement which has certain characteristics which are distinctly interesting. Predominant among these is its ability to attain a usable strength in a very short period of time. In June, 1922, the Boston Elevated Railroad Co. obtained some samples of this product and conducted a series of tests, the results of which are given in the tabulations.

The material was tested at the laboratories of the company in comparison with three well-known brands of American cement and with the specifications of the American Society for Testing Materials for 1921. Three different mixes of ciment fondu were used. Figures were obtained on the amount passing through a No. 200 sieve, the time of initial set and final set, the strength of the French cement after 24 hr., the strength of all cements of the 1 to 3 mix after 7 and 28 days, and the results of a 5-hr. boiling test. Separate tests were made of the one-to-two and one-to-one mixes of ciment fondu.

From the results it will be noted that the French cement obtained a strength in 24 hr. greater than any of the standard cements did in 7 days and that the 7-day test of the French cement is greater by 15 per cent than the 28-day test of the others. On the 28-day test it showed a slight loss in strength compared with that at 7 days. This cement, however, did not stand up well under the 5-hr. boiling test, as it cracked and scaled.

It was the intention of the road to secure some of this cement, if possible, for use during winter weather or for use in track work to shorten the time of from 7 to 10 days which is required with American cements before traffic can be turned on newly-concreted or paved track. Communications with French manufacturers, however, indicate that the question of supply has not been stabilized and so far it has not been possible (at the time of this writing) to secure any of this material.

We are indebted to Edward Dana, general manager of the Boston Elevated, for information on these tests.—*Railway Engineering and Maintenance*, April, 1923.

COMPARATIVE TESTS OF 1-3 MIXTURE

Make	Initial set	Final set	Per cent passing No. 200 sieve	24-hr. tensile	7-day tensile	28-day tensile
A. S. T. M.	*0.0 hr. 45 min.	†10 hr. 0 min.	78	.....	No. 200	*300
"A" Brand	2 hr. 40 min.	6 hr. 10 min.	85.2	.....	348	377
"B" Brand	2 hr. 50 min.	5 hr. 40 min.	85.4	.....	271	300
"C" Brand	3 hr. 20 min.	7 hr. 25 min.	85.0	.....	282	356
French	3 hr. 5 min.	6 hr. 20 min.	96.4	376	423	.....

*Not less than.
†Not more than.

COMPARATIVE STRENGTH OF DIFFERENT MAKES OF CIMENT FONDU

Mixture	24-hr. test	7-day	28-day	Per cent of strength
1 cement 3 sand	376 lb.	423 lb.	407 lb.	4.0
1 cement 2 sand	578 lb.	725 lb.	671 lb.	7.25
1 cement 1 sand	685 lb.	1,112 lb.	1,078 lb.	3.0

Phosphate Is Gaining Attention

THERE are more than 100,000 acres in northern and middle Florida believed to contain phosphate rock which have been withdrawn from entry by the Interior Department. Individuals assert patent rights to some of this property and a number of discrepancies in records have developed. Much of the land, however, never has been claimed for patent by private individuals. Geological work is to be conducted by G. R. Mansfield and G. W. Holland of the Geological Survey.

Florida's phosphate deposits are rated as the richest in the United States, particularly the pebble phosphate east of Tampa. In the northern part of the state the phosphate is hard rock or slate rock. The deposits on private lands have been extensively developed, principally for export demand. Development has slackened recently owing to a decrease in this demand occasioned in part by the development of phosphate in northern Africa, which, although of a lower grade, is closer to the German and French fertilizer markets.

Mr. Mansfield is completing a report on the phosphate deposits of Idaho which will be submitted to Acting Director P. S. Smith of the Survey before he goes to Florida. The Idaho deposits are extensive and of good grade. The greatest development in that state is that of the Anaconda Copper Co., which has built a seven-mile railroad to its phosphate mine and has established a plant to produce superphosphates, using acids from its other plants.

Keeping Labor Satisfied

Floating Labor Undesirable — Steady and Reliable Men Can Be Had by Furnishing Them with Suitable Homes and by Showing Interest in Them

By George M. Earnshaw
Associate Editor, Rock Products

EVERYBODY in some degree has noticed the return of prosperity and no doubt most every operator of a rock products industry in the United States has felt its least desired effect—shortage and independence of labor.

One of the rows of houses owned by the Blair Limestone Co., near Martinsburg, W. Va.

The United States Steel Corp. made its first complaint several months ago. Two weeks ago it raised its wage scale 11 per cent—the second raise in only a few months. Other large corporations are following suit. Everywhere everybody is saying, "Is the 1920 labor situation going to present itself this year?" Perhaps it will not, but it is evident that the coming season has in store for us some trials that will put a crimp in our "steady and consistent production" program.

But whether a general labor shortage exists throughout the country or not, there are certain locations where labor is hard to obtain and keep. Such localities are usually in isolated sections of the country many miles from a source of labor supply. Many operations, located in farming communities, have a certain fixed supply, and encounter difficulty in obtaining the proper kind of outside labor because of improper living accommodations. There is more than ordinary evidence of this condition this year. Even tenant farmers are moving to the city in unusual numbers.

Many companies so located have boarding camps which serve as an inducement to get men to take a job. But, as a rule, such a class of men—usually found in employment offices in the cities, who take a job just because of the boarding camp inducement—do not go to work with the view of working there permanently. They merely want to work long enough to get sufficient money to pay their way farther south, or north, or whatever direction they may be headed.

The result is, a company that tolerates such a condition is continually changing its organization—breaking in new men. Figuratively, it has three crews of men: one coming, one on the job and another crew going. To solve such a problem to many companies seems an utter impossibility. They blame it on the general shortage of labor, whether one actually exists or not.

So they continue year after year in the same old way. When a few men leave, a company sends its employment man to the city—probably 100 miles or more distant—to get more. Usually, the company has to pay the employment office a fee for each man in addition to his railroad fare to the plant.

The writer has many times observed a company in Pennsylvania shipping men to its plant from Pittsburgh, a distance of 50 miles, paying an employment-office fee of $2 and railroad fare in a similar amount for each man. The men would be treated in the best manner possible—excellent food, shower baths, real beds, good working conditions and high wages. But even with this unusual treatment, the average man would work from three to six days and then leave—he had made enough money to get to Cleveland or Buffalo, or wherever he was going. At one time the situation was so severe that this company had to ship men from Chicago. Two days after the arrival of this group of 10 men there was just one of them left. The company had spent approximately $200 for 10 men's work for two days.

At the left, the church and schoolhouse; boarding house at the right for single men

Although these illustrations of the merits of camps and the use of floating labor are

Providing your men with houses like these makes them happy and assures them that the company has their interests in mind

of unusual cases, they show clearly that some remedy is necessary. Floating labor fills the needs of contractors in towns and cities because they cannot offer permanent employment. Why not force this class of labor to its place and unite in discouraging its use in the rock products industries?

Steady employes are the best kind of men to have working for you and they can only be obtained and kept by treating them right and showing an interest in them.

An example of what the writer terms "treating them right" may be seen at the Martinsburg, W. Va., plant of the Blair Limestone Co. This company has spared no expense in providing living accommodations of the best kind for its men and practically every man on the company's payroll computes his length of service in the company's employ in terms of months and years, rather than of days and weeks.

This happy condition exists primarily because of the fact that the company owns 52 houses which house 85 families. Naturally, such a number of houses constitute a community, and it follows that something besides mere houses is necessary to keep such a number of people contented.

The settlement is divided into two communities—one for the white people and one for the negroes. Each community has its own school and church—assets to a better employment situation. A baseball diamond and grandstand, picnic grove, playgrounds for the children and a moving-picture house serve to keep the men and their families happy.

The houses which this company asks their men to live in are not mere buildings or shacks. They are modern, well-built frame structures, each provided with electric lights, water and a plot of ground for gardening. In addition, each family is furnished with coal and wood, a flat rate being charged for the rent, which includes all the extras.

While the company tries to base the rentals on the actual cost of upkeep, taxes, overhead, fuel, light, etc., with no intention to profit, it realizes it is losing money by operating the system in this way, but at the same time the officials feel that they have won the men's good will—that they may be depended upon for loyal, efficient service.

In the phosphate district of Florida may also be seen examples of how companies keep themselves provided with a desirable class of employes. One company — the American Agricultural Chemical Co.—has more than 125 houses for its white men and almost 100 for its negro employes—a little town by itself. These two communities likewise are provided with means of diversion. Not only do they have baseball parks, gymnasiums, playgrounds and movies, but men's and women's club houses, community houses and a welfare-association building.

This company also owns and operates several hundred acres as a stock and dairy farm so that its employes will be provided with milk, butter, eggs, meat and garden products at a price computed on a cost basis. Other living essentials are furnished them through a commissary.

These are only some of the things that wide-awake rock-products companies are doing to keep men of the desirable sort. A company that can offer labor such living accommodations as those described has a decided advantage over companies who cannot offer them, in that it can select its employes and have only in its employ men who have the interests of the company in mind and who feel that the company is interested in their welfare.

COMPETITION FOR LABOR

AS the season advances we shall probably see more and more competition for labor. Obviously there is not going to be enough to go around, if the present and prospective industrial pace keeps up.

Uncontrolled competition for a short labor supply is worse, if anything, for the producer than uncontrolled price-cutting in times of overproduction. They are both evils that must be guarded against, for the life of individual producers as well as for the health of the rock products industry as a whole.

Those operators who are compelled to bid for labor as the season advances will do well to consider if it is not a better method to put some of the money they must spend into permanent improvements in living quarters about their plants rather than to spend it all on wage increases for transient labor. There is a middle ground between paternalism, which right-minded workmen detest, and treating employes as fellow beings.

"Gypsum for Legumes" on the Radio

THE Gypsum Industries office announces that Dr. L. W. Erdman, former gypsum fellow at the Iowa State College, delivered a short talk on "Gypsum Legumes" on Friday evening, April 20, from the State College of Washington at Pullman, Wash.

Secretary H. H. MacDonald characteristically advised all the industry's radio fans to "Tune in on KFAE—and then write us what you think of the speech."

Why not provide a ball park, picnic grove and playground like this for your men and their families?

Lime Plant in Quarry—Packing Plant Above

Unusual Layout of Dietrick Brothers' Plant at Reading, Pa., Provides Simple Setting for Kilns—Burn Anthracite

DIETRICK BROTHERS (N. E. and W. L.) have a rather unusual lime plant at Reading, Pa. They are producers of dolomitic building lime and hydrate and agricultural lime. An analysis of the lime gives CaO 46 per cent; MgO 30 per cent. It is marketed under the brand, "Dietricks' Gold Medal Mason's Hydrate."

The hydrating plant and warehouse, looking east, showing five hard-coal draw kilns and two steel kilns

The Quarry

The quarry covers approximately 20 acres, all of which is underlaid with limestone and can be quarried to a depth of 75 ft. without any water difficulties, owing to the natural drainage conditions. There is limestone enough available for 30 years, even if worked at double the present capacity.

The limestone is of the dolomite character. The present equipment for quarrying consists of a No. 4 Schramm air compressor outfit, portable, and using a No. 66 Hardscog self-rotating hammer drill, which handles drill steels up to 12-ft., which is ample for the rock formation. The limestone is of medium hardness, and rather easily drilled. Blasting is done with an electric battery which has a capacity of 14 holes. Sizing and selecting of limestone for the kilns is hand work as well as the loading into carts for delivery to the inclined plane truck, which deposits stone close to the kilns.

Kilns

The kilns consist of five old-style internally-fired draw kilns and two modern steel kilns of the cupola type. The capacity of the draw kilns is 30 tons of stone each. The daily draw of lime is approximately 40 tons. This is partly due to the exceptional draft conditions, which are natural, and from the location of the kilns, which face westward. The depth of these draw kilns is 30 ft., and they are lined throughout with high-grade firebrick. Anthracite coal is used exclusively in these kilns, and coal of the pea size is giving best results, with a ratio of four to one or a trifle better.

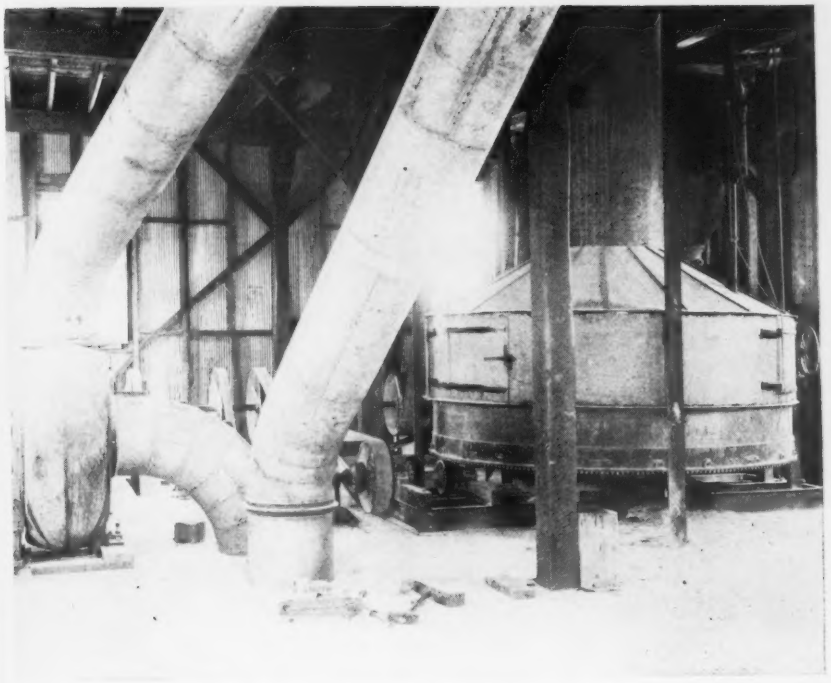
The steel kilns require a good grade of gas coal and produce a splendid quality of lime; however, they are not as economical to operate. The capacity of these kilns is 10 tons of lime each 24 hr. These are used for building lime, lump as well as hydrate.

Loading Out

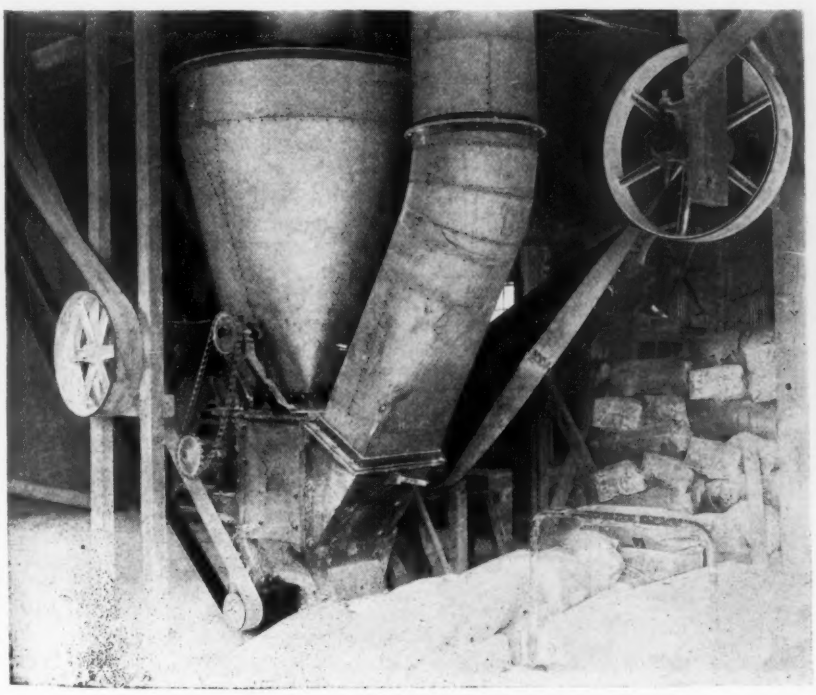
Lump lime as well as hydrate is marketed. Agricultural lump lime is loaded into one-ton dump cars and taken directly over the inclined plane and dumped into a chute which empties direct into box cars on a rail siding, so arranged that very little shoveling is required in the car.

W. L. Dietrick, Plant Manager

The lime for hydrating is handled in the same trucks and inclined plane to the bulk lime bin in the hydrating plant. A No. 1½ Sturtevant open-door rotary crusher reduces the lump lime to the proper fineness for hydrating (¼-in. and less). This crusher is located on the ground floor of the plant and the crushed lime is elevated to the third floor into a steel bin of 7 tons capacity. Thence it is automatically drawn into the weighing hopper over the hydrator. A No. 3 Clyde rotary hydrator used here has a capacity of 4 tons per hour or even better. This hydrator will hydrate a ton in 12 minutes if efficiently handled, and will hydrate thoroughly. A change of batches into the hydrator can be done in a trifle over a minute. This No. 3 Clyde has given very efficient service and under various conditions. It is very economical in operation as well, having required no expensive repairs in the number of years of service, according to N. E. Dietrick.



At the left is the No. 11 exhaust fan; at the right, the No. 3 hydrator



This is the No. 0 automatic pulverizer, located on the first floor

N. E. Dietrick, Sales Manager

The plant is completely equipped with a Raymond air-separating system, consisting of a No. 0 pulverizer and a No. 11 exhaust fan. At the speed they are operated their capacity is 4 tons per hour. The finished product tank has a capacity of 15 tons. It is connected with a Bates valve-bag packing machine. All of the product is packed in valve bags.

Storage of Lime

The storage capacity consists of a warehouse 100 ft. long, 32 ft. wide and 16 ft. high. The capacity in bagged storage is approximately 1400 tons. A piling machine of standard make is used to elevate as well as take down bags of hydrate when shipping out of stock. Cars are loaded with trucks of one-half ton capacity. A regular warehouse siding, convenient for loading, is provided.

The power plant consists of a 100-hp. boiler and a 60-hp. steam engine of the horizontal type—ample power for the service required, according to Mr. Dietrick.

The hydrate building is 32x52 ft. and 54 ft. high—concrete and timber construction throughout. Corrugated galvanized iron is used for siding.

Organization

The business is carried on under the firm name of Dietrick Brothers. N. E. Dietrick is the manager of sales and W. L. Dietrick has charge of the operation of the plant in its entirety. Originally, the brothers had charge of sales for a fertilizer concern in an extensive territory covering Pennsylvania and New Jersey. Naturally this connection with the trade, especially the agricultural trade, brought them into the lime game on a jobbing basis which they carried on for a number of years before entering into the manufacture of hydrated lime for building and agricultural uses. Both of the Dietrich brothers have been in personal contact with the trade for the past 20 years.

Quarry Man Highly Honored

John J. Sloan Made President of Chicago Board of Local Improvements

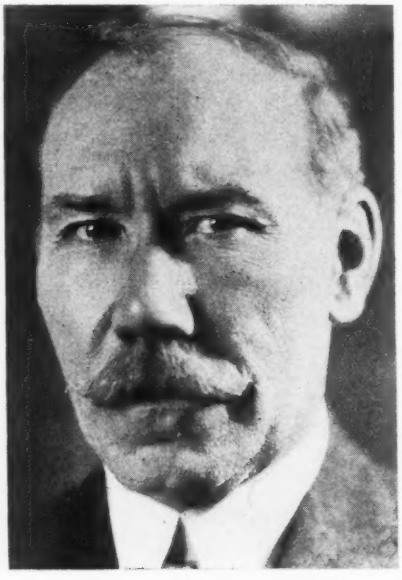
RECOGNITION of his integrity and force of character by his fellow citizens has won John J. Sloan, secretary of the Wisconsin Granite Co., Chicago, the appointment of president of the Board of Local Improvements of the City of Chicago. Incidentally, Mr. Sloan is treasurer and a director of the National Crushed Stone Association and one of its most active and enthusiastic workers.

With characteristic energy and zeal Mr. Sloan accepted the appointment only on the understanding that he will be given an aggressive board whose sole policy will be to benefit the city. The importance of this office is probably little appreciated by people unfamiliar with Chicago and Chicago methods of handling public work. The new Democratic mayor—William E. Dever—is quoted as believing that the chief opportunity of doing something worth while is through the Board of Local Improvements.

The Chicago *Tribune*—a Republican newspaper—of April 19 says: "One sentence will probably describe adequately Mr. Sloan's personal reputation. It may be said without authority, but with every confidence regarding its accuracy, that Mr. Sloan will not hinder the recovery of $2,742,000 paid the five favorite experts of the last administration.

"His ability, training, and experience fit him for the job of directing the work of local improvements. He is a product of the Armour Institute. He was chief clerk of the Department of Public Works years ago when it handled the special assessment work. Later he was superintendent of the bridewell, and made such a success of it that a private corporation grabbed him for a highly paid executive position. In a word, he has been trained in special assessments, engineering, paving materials, and in construction.

"It is reported that Mr. Sloan has not promised to remain in the city service during the mayor's entire term, but has



consented to stay only a limited period."

The Board of Local Improvements in the City of Chicago is the administrative board for public works of every nature. It not only has general supervision of all the engineering departments of the city employed on the works, but has entire supervision of their financing—the appraisal of property, special assessments, condemnations, etc. The presidency of the board is by far the most important post in the mayor's cabinet, having charge as he does of the spending of hundreds of millions of dollars every year, and the determination of the improvements for which it shall be spent. As Chicago is entering upon an unprecedented period of public improvements, the post is more important today than ever before.

Quarrymen the country over will unite in congratulating Mr. Sloan on the honor and recognition he has received; and if they are familiar with Chicago and its problems, they will no less congratulate the city on obtaining the services of such an enthusiastic and earnest worker for the public welfare.

Basic Products Co. Building a Lime Plant

THE Basic Products Co., Kenova, W. Va., will probably begin operation in its new plant extension now under way about July 1. General Manager Wood states that the extension would be devoted to manufacturing building lime and have a capacity of six carloads a day under a single shift and equipment to double this output when it becomes necessary. The new plant, of steel construction, 280x35 ft., will be located near the present plant.

The company has hitherto confined its output to the manufacture of refractories. At Kenova there are 150 men employed, and at the limestone quarry at Peebles, Ohio, about 80 men. It is capitalized at $500,000 by Pittsburgh interests.

Chain Bucket Dredge Developed at Baltimore

Inexpensive Sand and Gravel Machine of Large Capacity Designed to Meet Local Conditions

A LADDER, or chain-bucket, sand and gravel dredge having a capacity of 300 tons per hr., or 7200 tons per 24 hr., is illustrated herewith. This is a recent development of the first of its type, designed and built by the Ellicott Machine Corp., Baltimore, Md., in 1907. The builders state that the original dredge is still working every day, and is said to have repaid its cost to the owner within the first eight months' operation. Dredges of the same type are built in all capacities. The one shown can be built for about $80,000 or less. This dredge is steam driven, but the same design is used with electric power or oil-engine drive.

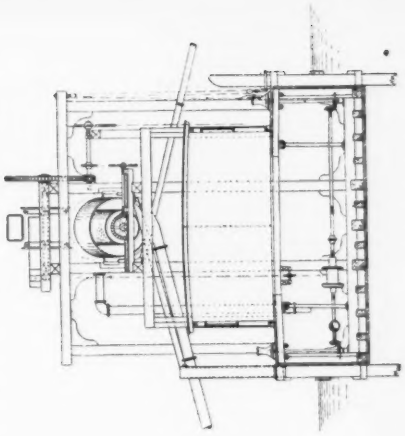
Description

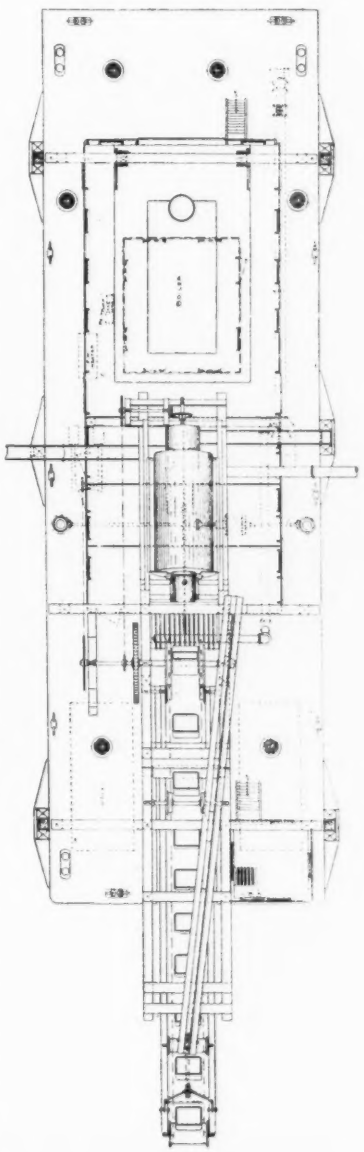
The hull is 90x32x9 ft., wooden construction. The excavating apparatus consists of an endless chain bucket elevator, which delivers the material to a hopper with a removable iron grating or grizzly, from which the passed material is delivered to a revolving cylindrical screen.

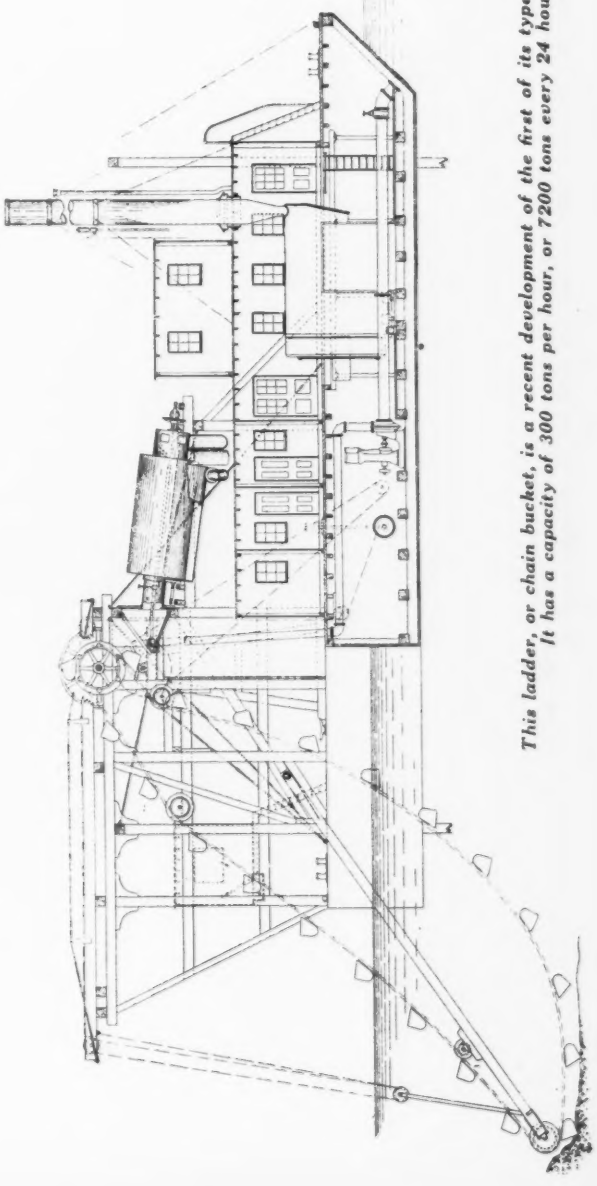
The sand and gravel are washed as screened by streams of water supplied by a high-duty centrifugal pump. No finished material is retained on the dredge, the sand being discharged to a scow on one side and the gravel to a scow on the other side of the dredge. The boulders retained on the grizzly go overboard at the stern, behind the excavator.

While digging the dredge is held by four spud anchors, two forward and two aft. The change of cut is controlled by means of wire-rope haulage on each side of the bow, with the stern pivoted, and the advance forward is accomplished by two of the spuds.

The bucket line consists of 25 buckets, each having a capacity of 7.63 cu. ft. The buckets discharge at the rate of 12 per minute, giving the dredge a capacity of approximately 200 cu. yd. or 300



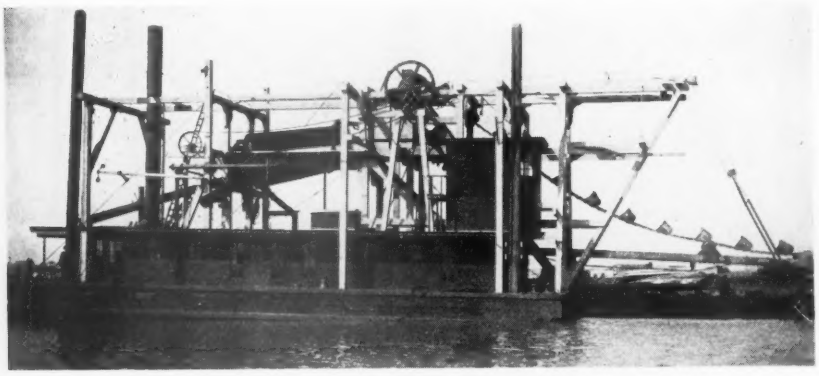




This ladder, or chain bucket, is a recent development of the first of its type; the original dredge is working every day. It has a capacity of 300 tons per hour, or 7200 tons every 24 hours, according to its manufacturers

tons per hour. The bucket chain and horn of the driving wheel are of manganese steel. The buckets have replaceable manganese steel lips. The boom, in the dredge illustrated, is 50 ft. long.

The winding machinery consists of a pair of non-reversing engines, operating a friction drum for raising the boom, four friction drums for hoisting the spuds and two vertical gypsies for breasting the scows. The



A sand and gravel dredge working out of Baltimore, Md.

The cylindrical screen is driven by a sprocket chain and toothed-gearing from a double reversible steam engine. Where several grades of sand and gravel are desired two screens may be placed athwartship, or cross-wise, at the discharge end of the first screen.

boiler plant consists of one 100-hp. boiler and one vertical donkey boiler of 15 hp. capacity. There is a feed-water heater and the necessary feed-water and service pumps. Water supply for washing the sand and gravel is supplied by a direct-connected centrifugal pump.

Southeastern Aggregate Producers Making Headway

"THE Southeastern Association of Aggregate Producers is going ahead in shaping its plans to deal with the necessary rate revisions which must come, allowing a time necessary to develop the facts and lay the foundation for future conferences with the railroads," announces the committee, A. P. Burke, H. B. Springer, and J. S. Waterman.

Charles E. Cotterill, the general counsel, has written the following in a letter to President Burke under date of April 7 in evidence of his careful observation of the necessities of the association and as keeping it advised of the details of development:

I have received from Charles Barham, chairman of the Southern Freight Association a letter advising that it is the thought of the railroads for us to proceed with our initial studies of the question of a proper revision of freight rates on aggregates in order to be prepared to join with the carriers later on in an exchange of preliminary views. Mr. Barham has emphasized the fact that it is not the wish of the railroads to assign subordinates to this matter, but that they would rather take a little more time and assign railroad executives to deal with it. This could not be done by them right away because of the pressure of other matters, but I have no doubt it will not be very long before we shall be asked to go into preliminary conferences.

I have further to report during the week just closed there came up for reconsideration by the Railroad Committee the matter of rates on gravel from Charleston and Western Carolina stations to points in Georgia. Attending the hearing were the principal producers and a number of county officials and representatives, all of whom opposed vigorously the specific increases.

In behalf of the association it seemed appropriate to take advantage of such opportunity to lay before the railroads some fundamental propositions bearing upon the whole subject of freight rates on such materials. I therefore addressed the railroad committee at some length and stressed the peculiar economic conditions which fully warrant exceptional treatments being accorded the materials in which we are interested. It seemed to be the impression of those present that it was appropriate to take advantage of such opportunity to lay the ground work for future representations to the carriers in connection with details of a comprehensive rate revision which eventually and probably soon will have to be dealt with.

I was impressed with the fact that the Railroad Committee realized the new association was functioning. Perhaps it would not be immodest to say further that the railroad officials seemed impressed with the main outline of our presentation of the general questions involved in fixing rates on such materials.

I am carefully observing the necessities of your association and am keeping you advised of details of developments.

Certain-teed Products Corporation's New Financing

BONDS to the amount of $8,000,000 have been placed on the market by the Certain-teed Products Corp., St. Louis, through S. W. Straus & Co. The purpose of this financing is to purchase the plants and properties of two large linoleum manufacturers; of the Acme Plaster Co., St. Louis, producers and distributors of gypsum and gypsum plaster products, and to retire outstanding purchase money obligations issued in 1920.

These first mortgage 6½ per cent serial coupon bonds are a closed first mortgage obligation of the company, constituting its sole funded debt and are secured by a direct first lien on all the land, equipment, machinery, etc., now owned by the company and to be acquired.

Under the covenants of the trust mortgage the bonds are paid off in yearly serial installments, the coupons being payable twice a year. The mortgage requires the company to make 240 monthly payments to Straus & Co., each monthly payment approximating $60,000. The mortgage expires in May, 1943. The bonds are in denominations of $1000 and $500 in all maturities; $100 in last maturity only.

The business of the Certain-teed Products Corp. was founded in 1904 and has expanded and grown until it now covers the United States as well as extending into many foreign lands. The average net profits after depreciation and depletion, before interest and taxes for the five years ended December 31, 1922, are equivalent to 2.9 times the greatest interest charges on these bonds. The earnings during the past 18 months are greatly in excess of this ratio.

The company operates roofing and paint plants at York, Pa.; Niagara Falls, N. Y.; Marseilles, Ill.; East St. Louis, Ill.; Richmond, Calif.; St. Louis, Mo.; linoleum and oilcloth plants at Philadelphia, Pa., and Trenton, N. J.; gypsum plants at Acme, Texas; Acme, Okla.; Acme, New Mex.; Grand Rapids, Mich.; Laramie, Wyo.; Cement, Okla.; Gypsum, Ore.

Agstone's Ohio Group Starts Advertising Campaign

THE Ohio Group of the National Agstone Association started its advertising campaign on April 14 in the *Ohio Farmer* and Ohio edition of the *National Stockman and Farmer*. President Lamkin and Chairman King have been selected to censor and approve all advertising copy. The sum of $5000 has been appropriated for this campaign.

Constructive Transportation Program for 1923

TWO member meetings were held in New York City on April 5 by the American Railway Association and the Association of Railway Executives, at which resolutions were adopted by the former and approved by the latter that in substance form the transportation program for this year. The resolutions are as follows:

1. That by October 1, 1923, when the peak movement ordinarily begins, cars awaiting repairs be reduced to the normal basis of 5 per cent of the total equipment of the country.

2. That by October 1, 1923, locomotives awaiting heavy repairs be reduced to the normal basis for the entire country of 15 per cent.

3. That to the extent coal is stored for railroad use complete the storage requirements by September 1 so that after that date the equipment and other transportation facilities may be used to the greatest extent for commercial coal necessities.

4. That the use of power and equipment for railroad construction and maintenance purposes be restricted to the minimum after September 1 in order that a maximum of power and equipment may be available for commercial purposes.

5. That railroads in producing and consuming sections impress upon all interested necessity for movement of coal and ore via the Lakes in the largest possible quantity early in the season. That railroads serving upper Lake ports carry on a campaign for early purchase and shipment of coal from the upper Lake docks to points of consumption.

6. That an effort be also made to bring about the prosecution of road and building construction work as early in the season as possible in order that equipment may be available for larger movement of seasonal commodities.

7. That all interested be impressed with the necessity for loading all cars to maximum capacity in an effort to bring the average loading to 30 tons per car for the entire country; for unloading cars promptly; increasing storage facilities where necessary and practicable and providing adequate siding capacity to facilitate loading and unloading, thereby increasing the number of available cars.

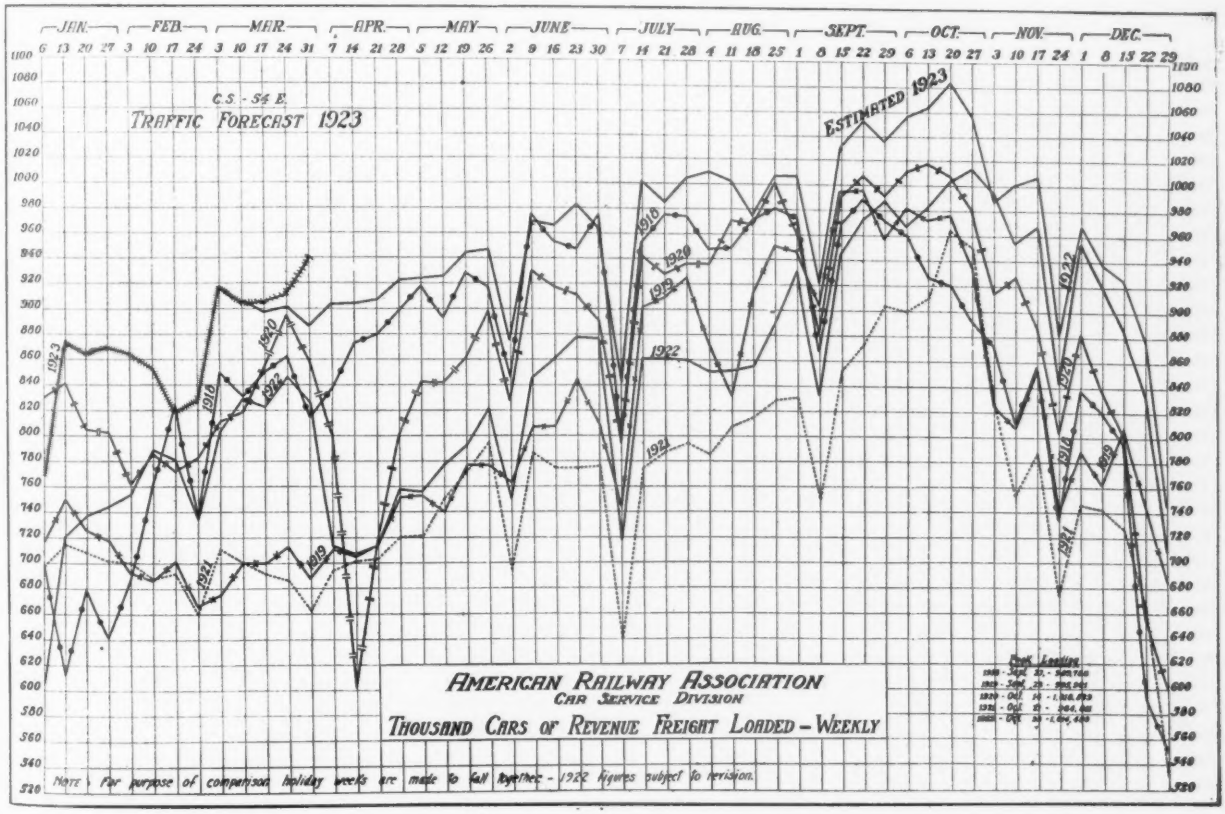
8. That every possible means be adopted to increase the mileage per car per day to an average of 30 for the entire country, particular attention being given to prompt movement through terminals and yards and to the issuance of embargoes when necessary to prevent congestion.

These associations also stated that "Co-operation of shippers and the public in the past has been most helpful in bringing about heavier loading, prompt unloading and increased mileage per car, and only by their continued co-operation and their full knowledge of what this means to their own transportation requirements can results be secured in these matters. It will be understood that each individual railroad will co-operate with its own shippers to this end and the Car Service Division will take similar action with national and district associations to bring about the fullest measure of co-operative effort."

Texas Cement Co. to Enlarge Plant

THE plants of the Texas Portland Cement Co., near Manchester, will be enlarged to bring its capacity up to the 800,000 bbl. mark in annual production, is the announcement of Chairman F. R. Bissell, who is also chairman of the International Cement Co.

According to Mr. Bissell, the present capacity of the Manchester plant is between 700,000 and 800,000 bbl. yearly. Completion of the additions under way will make the total investment in the neighborhood of $2,500,000.


C.S.-54 E.
TRAFFIC FORECAST 1923
ESTIMATED 1923
AMERICAN RAILWAY ASSOCIATION
CAR SERVICE DIVISION
THOUSAND CARS OF REVENUE FREIGHT LOADED – WEEKLY
Note: For purpose of comparison holiday weeks are made to fall together – 1922 figures subject to revision.

Cars of revenue freight loaded by the railways in 1918, 1919, 1920, 1921, 1922 and to March 31, 1923. The 1923 line is extended according to estimates made by the Car Service Bureau of the American Railway Association on March 10. Loadings since then, plotted by the editor, exceed the estimate by 50,000 carloads on March 31

Meeting of Ohio Sand and Gravel Producers

THE Ohio Sand and Gravel Producers' Association held its annual meeting at Columbus on March 28 with a fairly representative attendance. The association affairs were given a very careful survey and discussion.

Mr. Fuller, the secretary-treasurer, reported that the total receipts up to date were $3665.81, total disbursements $2342.08, and unpaid bills, $3665.91, leaving a deficit of about $2000. Of this deficit $1400 represents money owing to Mr. Bolander for conducting the freight rate cases at Columbus and Washington. To liquidate this indebtedness the secretary

F. E. Hall, president

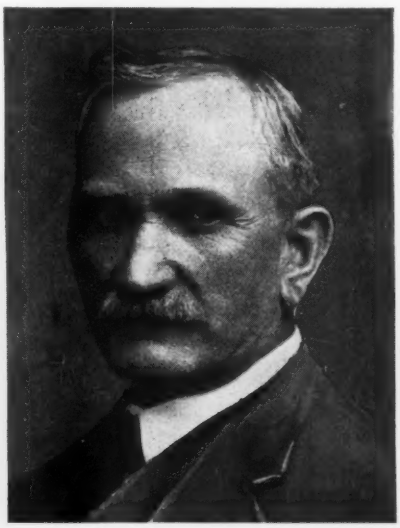
cancelled the balance of salary due him from last year and also agreed to work without compensation this year so that the members would have to take care of the $2000 deficit only.

It was determined therefore to let the assessment of 2 mills stand. Secretary Baker says that if all members will pay their assessments it will raise more than is necessary to take care of this deficit, the balance to be refunded pro rata.

It was further determined that, beginning with January, 1924, the annual dues for the association will be $25 for each member and that no fees will be paid the officers. The officers confidently feel that with such an arrangement every producer in Ohio will become a member.

On motion of Mr. Donnelly and seconded by Mr. Gill, it was unaimously decided that the old officers be retained during the year. The next meeting will be held at Columbus on July 12 for the purpose of having the new state highway commissioner meet the members.

At this meeting the following officers were elected: President, F. E. Hall, Cincinnati; vice-president, E. A. Evans, Zanesville; secretary-treasurer, F. C. Fuller, Portsmouth; executive secretary, Guy C. Baker, Greenville.



E. A. Evans, vice-president

Guy C. Baker, executive secretary

Changes in Schaffer-Alles Chemical Co.

DURING his recent brief visit to Rock Products, A. A. Alles, Jr., expressed his great belief in the lime-hardener compound, Piercite, which his company, the Schaffer-Allis Chemical Co., plans to manufacture and sell, an account of which appeared in Rock Products for April 7.

A change in organization makes the personnel now stand: President, J. C. Schaffer; vice-president and treasurer, A. A. Alles, Jr.; secretary, M. L. Kittell. A. F. Cooke's interest has been purchased by L. P. Dillon, who is president of E. Dillon's Sons, Inc., lime manufacturers at Indian Rock, Va.

F. C. Fuller, secretary-treasurer

Gypsum Increases Wheat Yields in Australia

IN Australia the government has recently experimented with gypsum on light soils to make possible the raising of wheat. A dressing of the soil at the rate of one and a half tons of gypsum and 100 lb. of superphosphate produced a yield of 27.4 bushels as compared with a yield of 6.5 bushels.

The above results were produced in 1921. In 1922 the experiments were repeated and the yields were 9 bushels with no dressing, 15.1 with 100 lb. of superphosphate and 25.6 with gypsum also.

Rock Products Activities in Canada

CANADA'S consumption of cement in 1922, according to Frank P. Jones, president and manager of the Canada Cement Co., Ltd., Montreal, was an improvement over 1921. On account of the war and the depression that followed Canada's consumption in 1922 was 38 per cent less than in 1913. Her capacity is now 2½ times greater than her consumption. Therefore the industry is in the position of the railways in Canada—overbuilt—as the cement industries, like the railways, depend upon the development of Canada and increased demand for cement on increased population.

The duty on cement coming into Canada from Great Britain is 5 cents per 100 lb. From the United States it is 8 cents which is today approximately 15 per cent on cement coming from that country.

The large items in the cost are labor, coal, transportation, repairs, sacks, taxes, interest and depreciation. Compared with 1914, labor is up 90 per cent, repairs 90 per cent, sacks 100 per cent and taxes 600 per cent. Most of the coal used in Canada to manufacture cement is imported from the United States, therefore the increased cost of transportation bears more heavily on the Canadian mills than on those which are situated more closely to the coal fields.

In addition, on account of the scattered population of Canada the transportation cost of each barrel shipped to the consumer is much greater than it is in the United States. Sacks there are cheaper than in Canada, the Canadian duty on sacks being 35 per cent. During the winter months shipments of cement drop 90 per cent, therefore stock houses in Canada for cement and sacks have to be from 60 to 100 per cent larger than for a similar mill built in the United States. As most of the machinery, structural steel, and other materials and equipment used in a cement mill are imported from the United States and bear a duty of from 27½ to 35 per cent, the cost of building a mill in Canada is greater than a similar mill in the United States.

The Canadian mill will cost at least from 25 to 40 per cent more than a mill of the same capacity over the line. The additional cost means larger capital investment and depreciation per barrel. In the past Canadian mills have had the advantage of cheaper power, but with the introduction of waste-heat boilers this advantage has passed.

Up to 1912 Canada was an importer of cement. On account of having overbuilt this condition has changed and Canada is now an exporter, but because of freight rates the export business cannot be developed. During the period when the cement consumption in Canada has decreased 33 per cent, the consumption in the United States has increased 40 per cent. Today the Canadian cement consumption is approximately ¾ bbl. per person and in the United States 1 bbl. The solution of the Canadian problem will take time, therefore while 1923 will not see a boom in cement consumption, it will undoubtedly show some improvement.

Notes from the Field

W. G. Treadwell has leased the property of the Gardener Feldspar Co., Hartington, Ont., retaining Mr. Gardener as manager, and is now shipping crude feldspar No. 1 for ceramic purposes which, he states, has proved satisfactory to his customers. He has also built a mill and installed a crushing plant to handle stucco dashes and poultry grits which are shipped as "Tregar Products." The requirements of stucco dash are exacting, as the product must be clean and absolutely free from dust. It must also be screened, graded, and bagged in different colors and sizes varying from ½ in. down to 100 mesh and the dust. The dust is mixed with the finishing coat. The new plant was designed by Mr. Gardener, who has had a wide experience with standard crushing plants and is turning out a product with brilliantly colored surfaces which give an artistic finish to colored work.

Canada cement plants are mostly closed down, owing partly to the late spring. Frank P. Jones states that they are not likely to operate at more than 50 per cent capacity, or about the same as last year.

Archibald McMeekin has sold his large gravel pit at Cataract, Ont., to the Dufferin Construction Co., Toronto. It is the intention of the new owners to build a plant which will give an output of 20 carloads per day.

The plant of the Canada Crushed Stone Co. at Dundas, Ont., has been re-opened after being shut down for the greater part of this winter. During that period the machinery was overhauled. A big season in road building is anticipated, with a consequent good demand for crushed stone.

LIME ASSOCIATION CONVENTION

THE fifth annual convention of the National Lime Association will be held at the Hotel Commodore, New York City, on June 13, 14, and 15.

The work of the convention will be devoted in a large measure to reports from the technical men of the research organization, and from the field engineers of the association.

Market for American Cement in Cuba

IMPORTATION of cement from the United States into Cuba in 1922, says *Commerce Reports*, showed a decrease of 65 per cent in quantity and of 53 per cent in value as compared with 1920. A large percentage of this decrease was no doubt due to the suspension of practically all construction work during the financial depression through which Cuba has just passed, the total consumption of cement in the island having decreased 47 per cent during this period. Shipments of cement from the United States to Cuba during the past four years have been: 1922—443,391 bbl.; 1921—447,706 bbl.; 1920—1,275,169 bbl.; 1919—1,061,786 bbl. In 1920 (the latest year for which figures of imports from all countries are available) the remainder of the imports of cement into Cuba came mostly from Canada (40,507 bbl.), with the Netherlands, France, Belgium, and other countries making small contributions.

A higher rate of duty levied on imports from other countries and slightly higher ocean freight rates have served to offset any price advantage that European exporters might have had through cheapness of labor. While several European countries have previously enjoyed a share in the cement trade, the greatest competition of the present and future is furnished by local manufacturers. The domestic product, which is manufactured by the "wet" process, and is equal in quality to that imported, amounted to 500,000 bbl. in 1922, 435,000 bbl. in 1921, 460,000 bbl. in 1920, and 310,000 bbl. in 1919. An advantage is had by American exporters over the local manufacturers in that the combined steamship and railroad freight charges on cement exported from New York destined for the central or eastern interior of Cuba are from 10 to 20 per cent less than the railroad freight charges from Havana, nothwithstanding the local producer is allowed a small preferential rate by the local railways.

An extensive advertising campaign is now being carried on by a local factory, no doubt in view of the fact that the economic situation has improved considerably in the past six months and that a large amount of construction work will take place this year. It has been unofficially stated that work will be resumed in the near future on a number of government projects which were suspended during the financial depression. In this event the consumption of cement for 1923 would be greatly increased.

Astone's Harrisburg Meeting

THE Pennsylvania Group of the National Agstone Association held its second meeting at the Penn Harris Hotel, Harrisburg, Pa., on Monday, April 2, Chairman P. B. Reinhold presiding. A communication was read from Secretary of Agriculture Wallace advising that he could not be present. Henry Ford also said that he could not attend.

In his opening remarks Chairman Reinhold made a strong appeal for agstone producers who sold their product in Pennsylvania for co-operation in a vigorous advertising and boosting campaign. J. C. King strongly supported the chairman's plea for teamwork. Secretary Sandles briefly stated that there was no doubt that agstone producers could produce more material and that the farmers needed more agstone.

Mr. Ebersole advocated greater service in the way of truck delivery, storage, etc., to help the farmer. C. G. King did not agree with the previous speaker. "Let the farmer help himself," said he, "then he will find out that service costs money; that agstone is worth money and cannot be given away."

J. C. King testified that his warehouse, erected two or three years ago, had not yielded him one cent of profit.

General discussion followed on off-season delivery, dating ahead, and reduced prices. It was brought out that Lancaster county, Pennsylvania, had won a world-wide reputation as the best farming country in the world, and that this reputation was largely due to the fact that agricultural limestone was first used in Lancaster as a soil sweetener and crop booster; it had for years been a generous user of agstone.

The following officers were elected: group president, Elwood Gilbert, New Castle, Pa., New Castle Lime and Stone Co.; chairman, board of directors, P. B. Reinhold, Reinhold & Co., Pittsburgh, Pa.; treasurer, J. C. King, Carbon Limestone Co., Youngstown, Ohio; temporary secretary, A. P. Sandles, 405 Hartman Bldg., Columbus, Ohio.

Mr. Gilbert and Mr. Reinhold were authorized to appoint a board of directors and officers to serve until such time as permanent officers and directors can be elected.

The group decided to advertise in the *Pennsylvania Farmer* and the *National Stockman and Farmer* so far as the "ad" fund will reach.

Mr. King was authorized to determine the size of the ad for the group, and that it carry the names of all subscribers so that prospective buyers may correspond directly with each producer.

This group also indorsed the movement to erect a memorial building to commemorate the great educational work of the late Dr. William Freer of Pennsylvania State College, who was a pioneer in advocating the need and the use of agstone, and that "we unanimously recommend that all persons and firms who sell agstone in Pennsylvania donate to this memorial fund."

The following subscribed to the advertising fund: Reinhold & Co., Pittsburgh, Pa. (P. B. Reinhold); Carbon Limestone Co., Youngstown, Ohio (J. C. King); Limestone Products Corp. of America, Newton, N. J. (Edward S. Bixler); York Valley Lime and Stone Co., York, Pa. (F. W. Cramer); New Castle Lime and Stone Co., New Castle, Pa. (Ellwood Gilbert); Grove City Lime and Stone Co., Grove City, Pa. (K. C. Styers); E. J. Lavino & Co., Philadelphia, Pa.; Kittanning Limestone Co., Kittanning, Pa.

It was agreed that the president and chairman should fix the time and place for the May meeting.

The attendance was as follows:

P. B. Reinhold, Reinhold & Co., Pittsburgh, Pa.; John Jay Reinhold, Marietta, Pa.; S. B. Patterson, Calcite Quarry, Myerstown, Pa.; Cleason G. King, Palmer Lime and Cement Co., York, Pa.; J. C. King, the Carbon Limestone Co., Youngstown, Ohio; James T. Davis, E. J. Lavino & Co., Philadelphia, Pa.; Ellwood Gilbert, New Castle Lime and Stone Co., New Castle, Pa.; William D. Kochensperger, Limestone Products Co., Mifflinsburg, Pa.; A. R. Ebersole, Ebersole Engineering Co., New Holland, Pa.; Walter W. Duff, New Castle Lime and Stone Co., New Castle, Pa.; E. R. Walker, "Pennsylvania Farmer," Philadelphia, Pa.; W. D. Benedict, "National Stockman and Farmer," Philadelphia, Pa.; J. K. Bowman, Department of Public Instruction, Harrisburg, Pa.; John B. Fox, West Branch Lime Co., Williamsport, Pa.; A. P. Sandles, secretary, National Agstone Association, Columbus, Ohio.

LIME ASSOCIATION CONVENTION

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The work of the convention will be devoted in a large measure to reports from the technical men of the research organization, and from the field engineers of the association.

British Quarry Managers to Hold Annual Meeting

THE annual conference and general meeting of the Institution of Quarry Managers of Great Britain will be held at Llandudno, North Wales, on June 28-30. The program includes visits to limestone, roadstone and slate quarries and an explosives plant.

Among the papers to be read are: "Portmadoc Slate as a Roofing Material," by Capt. E. Andrewes; "Liming the Land—the Importance of Agricultural Lime," by George Mann Watson, B.A.; "Lime Burning—the Economization of Fuel," by Dr. Oliver Bowles, Bureau of Mines, U. S. A.; "What Is the Best Aggregate for Tar-Macadam," by A. B. Searle, consulting technologist, Sheffield.

The president, Sir Henry P. Maybury, Director of Roads, Ministry of Transport, will preside at the annual general meeting on Friday, June 29, and also at the annual dinner in the evening. Headquarters will be at the Marine Hotel, Llandudno.

Any American managers who are in England on the dates mentioned are given a cordial invitation to attend the conference. Further particulars will be gladly given to those interested, on application to the secretary, Barclays Bank Chambers, Carnarvon, North Wales.

Adams Bag Co. Offices Now at Chagrin Falls

A NEWLY-BUILT two-story office building overlooking the Chagrin river is now the home of the Adams Bag Co. The sales and executive offices were moved on April 2 from 1900 Euclid building, Cleveland, Ohio, to its paper mill and bag factory at Chagrin Falls, Ohio.

The consolidation of the general offices with the plant offices is a step in the reconstruction and enlargement program determined upon three years ago. The factory has been remodeled and enlarged and much of the old equipment replaced with new. The new office building, built as an addition to the paper mill, will result in closer personal touch between the sales and manufacturing organizations.

New Intrastate Rates Proposed for Illinois

INTERSTATE COMMERCE COMMISSION examiners have recommended that the intrastate cement rates between points in Illinois and also Indiana be wiped out as unduly prejudicial to Indiana mills and that the commission establish a scale of rates for uniform application on cement between points in a territory embracing southern Wisconsin and all of Indiana and Illinois. The scale of mileage rates proposed will also apply from St. Louis and Hannibal, Mo., to destinations in the territory described. The cement mills did not oppose a uniform mileage scale, but disputed about the rules for applying whatever mileage scale was agreed upon, and for applying the scale over routes between the same points but of different lengths. A producer at Buffington, Ind., wanted the same rates as though located in Chicago, but the examiners did not approve of that request.

With some modifications, it may be said that the scale proposed begins with a rate of 6.5 cents per 100 lb. for 15 miles or less and increases one-half a cent for every 15 miles additional or less for distances up to 100 miles. The rate for 100 miles is 10 cents; for 110 miles 10.5 cents. Up to distances of 200 miles one-half a cent is added for each additional 20 miles or less. For distances 200 to 300 miles, one-half a cent is added for each 30 miles or less, etc.

Activities of Two Texas Cement Companies

THE Southwestern Portland Cement Co. of Los Angeles and El Paso will begin constructing a cement plant at Fort Worth, Texas, to cost $1,250,000. It will have an initial capacity of 3000 bbl. a day and employ about 225 men. The company has contracted for 600 acres of land 1½ miles south of the city and tests of the deposit are being made. President C. Leonardt of Los Angeles will complete arrangements for immediate construction. O. J. Binford, secretary and general superintendent, and R. H. Coghlan, chemical engineer, are there on business connected with the project.

Plans have been adopted by the Texas Portland Cement Co., a subsidiary of the International Cement Corp., New York, for enlarging its cement plant at Manchester, a suburb of Houston, from about 725,000 bbl. a year to 800,000, according to F. R. Bissell, chairman of the boards of the two companies. When the addition is finished the Manchester plant will have cost about $2,500,000. It is the only cement plant in the United States using oyster shells for its raw material. These shells are obtained from the enormous shell banks along the Gulf coast of Texas.

North Carolina Large Buyer of Cement

SUFFICIENT cement has been assured for the uninterrupted construction of 110 miles of hard surfaced roads to be let by the Highway Commission of North Carolina. Approximately 300,000 bbl. has been secured by Chairman Page, the contract calling for deliveries in May, June, July and August. Mr. Page said that he had obtained the supply under advantageous terms and at no advance in prices.

That the North Carolina plan of organization is to be recommended to all other states in the formation of highway commissions in financing, maintaining and constructing roads was the result of a conference of highway engineers from all over the country at Harrisburg recently, when Governor Pinchott sought advice in the reorganizing of Pennsylvania's highway department.

Gager Adding Another Crushing Unit

ANNOUNCEMENT was made in the early part of this month that the Gager Lime Co., Sherwood, Tenn., will add a second unit to its present crushing operation.

A No. 6 Austin gyratory, which the company had on hand, will be installed as the primary breaker. The remainder of the equipment will be new and will be furnished by the Kennedy-Van Saun Mfg. and Engineering Corp., New York. W. J. Cavanaugh, sales engineer of that company, is the designer of the new plant and will have direct supervision of the installation.

According to the present plans, the product of the initial crusher will be removed by a No. 5 Kennedy belt bucket elevator of 42-ft. centers, to a manganese bar grizzly with 1½-in. openings. Rejections from the grizzly will be moved by gravity to a No. 25 Kennedy gearless crusher. The material from this crusher, together with that passing through the grizzly, will be elevated by a second No. 5 elevator to a 48-in. by 16-ft. revolving screen, fitted with a 7-ft. dust jacket. Oversize will be returned by gravity from this screen to the secondary crusher.

The installation of the secondary crusher will permit the making of small sizes in large quantities and, by adjustment, affords the making of large sizes suitable for ballast. The daily output of the new unit will be approximately 500 tons.

A New Cement Plant for Canada

IT is announced from Montreal that the National Cement Co., headed by Isaie Laplante of Fall River, Mass., together with several Massachusetts and Canadian men, will erect a plant in Montreal East with a capacity of 3000 bbl. daily. It will be near the main line of the Canadian National railway and the St. Lawrence river, from which power will be obtained at a minimum cost. The ground will probably be broken about May 1 and the plant in operation by the first of next year.

The management will be in the hands of Isaie Laplante, president; Manuel Sylvia, a New Bedford banker, vice-president; Edmond Cote, Fall River, treasurer and general manager; Joseph Versailles, Montreal; Isaac Bernard, Fall River; E. C. Vidricaire, Montreal; John F. Hurley, president New England Building Development Corp., Boston; E. A. Ouimet, Montreal, and the Hon. H. B. Rainville, Montreal.

Vandervort Selected by National Agstone for Research Work

PROF. FIRMAN E. BEAR, chief of the soils department, Ohio State University, has secured the services of Carl W. Vandervort, who will graduate from the College of Agriculture this summer, to do review and research work for the Ohio Group of the National Agstone Association.

Mr. Vandervort's services will cost $500 per year. The cost of printing and distributing his monthly bulletin will be additional. This bulletin will be a thorough review of what's doing in agstone throughout the country, and while this service will be paid by the Ohio Group, a copy will go to the entire membership of the national association.

Professor Bear advises that he and other members of the university faculty will censor and approve Mr. Vandervort's bulletin before it is broadcasted. This practically insures producers that this bulletin will be official and along safe and scientific lines which both producer and purchaser will be safe in following.

Some of the members will order from 500 to 2000 copies for distribution in their territory. Such extra copies will be furnished at cost. This bulletin will be similar to those issued by the National Fertilizer and the National Lime associations.

Mr. Vandervort began his work on April 1 and will have his first bulletin ready by May 1.

Prof. Broughton Awarded Agstone Fellowship

IT is announced by Prof. Firman E. Bear that the publicity given by National Agstone Association bulletins and ROCK PRODUCTS, *Pit and Quarry*, and *Cement, Mill and Quarry* have so broadcasted the news of the Ohio Agstone Fellowship at Ohio State University that he has received many applications from all sections of the country, one of them from the state of Washington.

Professor Bear says that he has practically completed arrangements whereby Professor Broughton of Maryland State College will be awarded this fellowship, which will be financed by Ohio agstone producers at $2000 per year for five years. Professor Broughton will start his work on June 1. The Ohio State University will co-operate and assist him. Professor Bear is determined to make this the biggest enterprise in the history of agstone.

Secretary Barrows Does Himself Proud

THE current issue of the *National Sand and Gravel Bulletin* is particularly good evidence that the sand and gravel producers association is driving home the advantages of clean and graded aggregates.

Right at the start, there is a report of J. L. Shiely's recent talk before the Minneapolis Engineers Club. His address was part of a well-planned educational campaign for suitable aggregates. A short illustrated article describes the Mascot, Tenn., plant of the American Limestone Co.; there is something about the physical researches being conducted by the Bureau of Public Roads and the appointment of Mrs. Beach, who will collect statistics on the country's sand and gravel production; the Pennsylvania Sand and Gravel Producers' Association exhibit at the recent Building Show at Pittsburgh, fine publicity for the use of suitable materials; and a page cartoon depicting the contractor who uses unsuitable material—he's "gambling with Fate." And there are the usual spicy, short personal notes telling of current happenings.

Hints and Helps for Superintendents

Making Use of Discarded Shovel Handles

IT has been general practice, especially in the rock products industries, to scrap a hand shovel when its handle is broken. Usually, the broken handle is removed and a new one put in its place, saving only the blade.

Shovel handles mounted on chains save the loader's hands many blisters

At the plant of the Knoxville Sangravl Material Co., at Knoxville, Tenn., this custom has not obtained, for here broken shovel handles are in great demand, for one of the company's employes found that the shovel handles could be used to advantage on chain-operated bin gates.

Since it is not necessary that chains controlling this type of gate be pulled vertically more than 18 to 20 in. to open or close a gate, it was found that by sawing off the stem of a shovel handle and boring a ¼-in. hole in the handle proper, it could be wired to the chain—one on either chain—thus affording a hand grip which enables a man to obtain a direct leverage and a more consistent pull without injuring his hands on the chain. Pulling a sprocket chain once or twice does not injure one's hands, but where it is necessary to pull chains continually—loading hundreds of motor trucks and several railway cars per day—one can easily see that the palms of a man's hands would soon be covered with blisters.

Protection During Blasts

HEREWITH is illustrated how the Louisville Cement Co., Speed, Ind., provides safety for its quarrymen during a blast and how, incidentally, it saves money which in many quarries is paid out for time that is not utilized in production—time that is spent at the average operation in going to and from some distant place of safety before and after the blasts.

Safety houses like this in the quarry save many dollars for a company

At many large open quarries it is necessary for men to go one-eighth and sometimes as far as a quarter of a mile from a blast. For instance, in a quarry of modest size, employing, let us say, 20 men, who are paid an average hourly rate of 30 cents. If it is necessary that these men go one-eighth of a mile from a blast, it means that each man spends at least a total of 20 minutes, including going, waiting for the blast, and returning to his work. This entails an expenditure of exactly $2 for every series of blasts.

The Louisville company is no doubt cutting this cost at least in half by the installation of steel cylindrical tanks, such as shown in the illustration. This tank was located not more than 100 ft. from the blast.

For this company this type of safety "house" is inexpensive as they once served as coolers in the cement mill proper. By merely closing up one end of a cylinder with heavy timbers and bolting 2x4-in. timbers extending the full length on either side for the men to brace themselves against, the tanks needed no other alteration in being converted from coolers into places of safety.

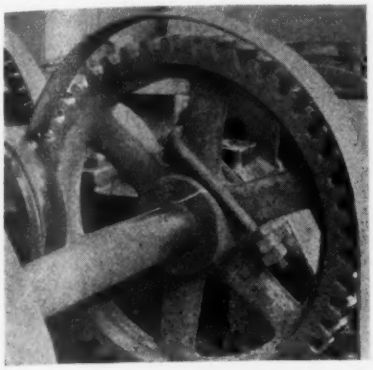
Prior to using these steel cylinders for this service the company used safety houses of V-shape timber construction, as illustrated. While this type of protector is perhaps more practical, due to the fact it can be constructed very easily at any operation, it is not as efficient as the steel-tank type because it is more cumbersome to handle; also, it cannot be placed as near to a blast. The steel-tank type is especially desirable because it can be easily rolled from one place to another.

This steel tank can be located within 100 ft. of a blast to provide safety for the quarrymen

Repairing a Cracked Gear

THE accompanying illustration shows how one of the employes of the Knoxville Stone and Lime Co., near Knoxville, Tenn., repaired a cracked gear hub on a steam hoisting engine.

When the crack was discovered it seemed



How a cracked gear hub can be temporarily repaired with a U-bolt

to the operator that the hoist must be put out of service until a new gear could be sent out from the factory; it looked as though it would break completely through at any moment. Likewise, this operator realized that to put the hoist out of service would shut down the entire operation. It was then that the old adage, "Necessity is the mother of invention," was fulfilled.

As shown, the hub cracked at a point favorable for the application of the remedy used. The U-bolt applied is of ⅞-in. material with a 5⅛-in. plate held securely by two nuts on each side.

Although applied only as a temporary remedy, this improvised method has been in use several months, and gives satisfactory service.

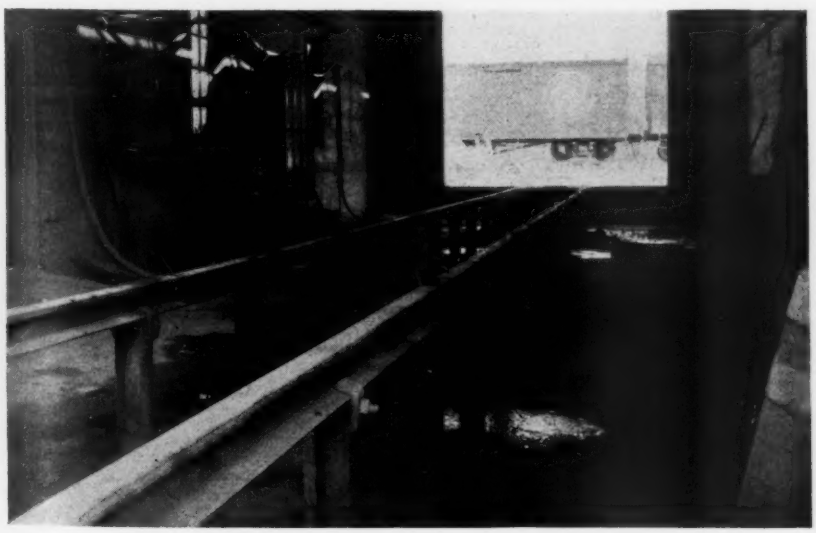
Elevated Track in Shop

PERHAPS one of the most necessary provisions at an operation where locomotives and cars are used is a shop where such equipment may be rebuilt and repaired.

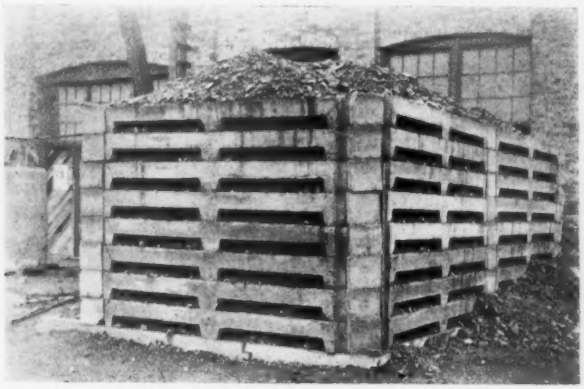
In building shops for this purpose it is customary to provide them with pits under the tracks to permit workmen to make repairs from underneath. This feature is especially necessary in shops where locomotives are repaired, as access can only be had to certain working parts of an engine from underneath.

However, at the plant of the Southern States Portland Cement Co., Rockmart, Ga., a novel plan has been introduced covering this feature, for, instead of having a pit, the company provided the repair shop with an elevated track. In this way the shop is furnished with the equivalent of a pit, utilizing its full length, so that it is not necessary that cars or locomotives be placed at any particular spot for repairs.

The method of installing the elevated track is shown in the illustration. As the machine shop is equipped with power saws and drill presses, it was a comparatively simple and inexpensive operation to cut these old rails into 3-ft. lengths and sink them vertically in the concrete floor at the time it was poured, so that they extended 20 in. above the floor level. The method of mounting the rails on these supports may be seen in the accompanying illustration.



This elevated track makes car and engine repairing easy



A carload of coal held in place by concrete cribbing

Storing Coal

INGENUITY has come to the front with another idea to interest every user of coal in the recent use made of pre-cast concrete for storing a quantity of coal deposited for power plant consumption where no storage bins were provided. In order to confine the carload of coal received to a minimum space and particularly to prevent the coal from blocking the passageway into the power house and from getting on the adjacent tracks, as well as to make its disposition as convenient as possible without undue expense, advantage was taken of the presence of a supply of pre-cast concrete sections to make a cribbing bin. The bin is 8 ft. wide, 16 ft. long and 8 ft. high and was built of a form of cribbing identical to that used in a 20 ft. retaining wall erected in 1915 and still in service on the Chicago, Rock Island & Pacific at Seventy-Ninth street in Chicago.

This cribbing, called interlocked pre-cast reinforced concrete cribbing and a product of the Cement-Gun Construction Co., Chicago, is made in the form of stretchers and headers, which, as the name implies, are so designed as to interlock with each other when in place. In building the crib stretchers were used for the sides and one end of the enclosure, the end of the crib next to the power house having been left open for convenience in securing the coal. These sides were locked together at the middle by headers extended crosswise with the bin and the built-up end was secured in place by extending the headers inwardly from the corners of the bin at an angle of about 45 deg. with the sides, the weight of the coal upon these headers preventing any movement while the bin was filled.—*Railway Engineering and Maintenance.*

Traffic and Transportation

By EDWIN BROOKER
Munsey Building, Washington, D. C.

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week April 16:

Central Freight Association

6234. Sand, Gravel and Crushed Stone, Kenneth, Lake Clecott, and Perkins Spur, Ind., to points on T. P. & W. and Pennsylvania.

On Sand and Gravel:

To:	Present Rate Kenneth	Present Rate Lake Clecott	Proposed Rate Kenneth	Proposed Rate Lake Clecott
Kentland, Ind.	$0.88	$0.76	(*)	$0.80
Effner, Ind.	.88	.76	.80	.80
Sheldon, Ill.	1.01	1.01	.80	.80
Eastburn, Ill.	1.01	1.01	.80	.80
Watseka, Ill.	1.01	1.01	.80	.80
Leonard, Ill.	1.05	1.05	.90	.90
Gilman, Ill.	1.12	1.12	.90	.90
Pipers City, Ill.	1.12	1.12	.98	.98
Forest, Ill.	1.12	1.12	1.01	1.01
Fairbury, Ill.	1.12	1.12	1.01	1.01
Chenoa, Ill.	1.12	1.12	1.01	1.01
Meadows (McLean Co.), Ill.	1.12	1.12	1.01	1.01
Enright, Ill.	1.12	1.12	1.01	1.01
El Paso, Ill.	1.12	1.12	1.01	1.01
Secor, Ill.	1.12	1.12	1.01	1.01

(*) Rates from Lake Clecott, 76 cents.

Crushed Stone and Screenings:

To:	From Kenneth Present	From Kenneth Proposed	From Perkins Spur Present	From Perkins Spur Proposed
Sheldon, Ill.	$0.88	$0.80	$0.76	$0.66
Eastburn, Ill.	.88	.80	.76	.66
Watseka, Ill.	.88	.80	.76	.66
Leonard, Ill.	1.04	.90	.92	.80
Gilman, Ill.	1.04	.90	.97	.80
Pipers City, Ill.	1.12	.98	.97	.88
Chatsworth, Ill.	1.12	.98	.98	.88
Fairbury, Ill.	1.12	1.01	.98	.95
Weston, Ill.	1.12	1.01	.98	.95
Chenoa, Ill.	1.12	1.01	.98	.95
Gridley, Ill.	1.12	1.01	1.01	.95
Enright, Ill.	1.12	1.01	1.01	.95
Secor, Ill.	1.12	1.01	1.12	.95
Eureka, Ill.	1.12	1.01	1.12	.95
Washington, Ill.	1.12	1.12	1.12	1.01
Farmdale, Ill.	1.12	1.12	1.12	1.01
East Peoria, Ill.	1.12	1.12	1.12	1.01

6286. Sand and Gravel, Peru, Ind., to Indiana. Present, classification basis. Proposed, to Muncie, Ind., and intermediate stations, 60 cents per net ton; Richmond, Ind., and intermediate stations south of Muncie, Ind., 70 cents per net ton; Chicago and intermediate stations, 70 cents per net ton.

6288. Lime, Manistique, Mich., to Farwell, Clare, Mt. Pleasant, Forest Hill, Alma, Ithaca, Ashley, Elsie, Owosso, Paines, Saginaw, Bay City, Midland, Corunna, Vernon, Durand, Howell, Hamburg, Whitmore Lake, Ann Arbor, Holly, Wixom, Pontiac, Detroit, Pittsfield, Milan, Romulus, Dundee, Mich.; Toledo, Ohio; Sheridan, Greenville, Ionia, Sparta, Muskegon, Ferrysburg, Grand Haven, Spring Lake, Lansing, Trowbridge, Charlotte, Eaton Rapids, Hastings, Allegan, Monteith, Kalamazoo, Augustus, Battle Creek, Ceresco, Marshall, Albion, Jackson, Mich.; present, 17 cents; proposed, 16 cents.

6290. Sand and Gravel, Merom and Riverton, Ind., and Palestine, Ill., to Illinois stations:

To:	Merom, Ind. Riverton, Ind. Present	Merom, Ind. Riverton, Ind. Proposed	Palestine, Ill. Present	Palestine, Ill. Proposed
Mt. Carmel	$2.70	$1.10	$1.90	$1.10
Mauds	2.80	1.10	1.90	1.10
Belmont	2.80	1.10	1.90	1.10
Albion	1.26	1.10	1.26	1.10

6296. Crushed Stone and Crushed Stone Screenings, Bluffton, Ohio, to Ohio:

To:	Present 6th class	Proposed rate per net ton
Upper Sandusky	$0.11½	$0.90
Kirby	.11½	.90
Forest	.11½	.90
Dunkirk	.09½	.80
Dola	.10½	.80
Ada	.10½	.80
Elida	.10½	.70
LaFayette	.10½	.70
Delphos	.10½	.80
Middlepoint	.12	.80
Van Wert	.12	.90

6306. Crushed Stone and Stone Screenings, C. L., Greencastle, Ind., to Frankfort, Ind., present, $1.05 per net ton; proposed, 90 cents per net ton.

Illinois Freight Association

377E. Lime, carloads, to revise rates from profreight charges, namely, where the benefit of this ducing points in Missouri, viz.; Mosher, Ste. Genevieve, Glencoe, Glen Park, etc., to Milwaukee, Wis., to provide for same adjustment over Chicago as is applicable from Mitchell and Milltown, Ind., Hannibal and Louisiana, Mo., and Alton, Ill.

1757. Molding Sand, C. L., min. wt. 90 per cent marked capacity of car, except when loaded to full visible capacity actual weight will apply, $2.25 per net ton from Dallas City, Gladstone, Jaynes Spur and Lomax, Ill., to Lake Mills and Stoughton, Wis.

1762. Sand and Gravel, C. L., min. wt. 90 per cent of marked capacity of car, 70 cents per ton from Steele, Ill., to Chicago, Englewood, Oak Forest, Minooka, etc., 84 cents to Morris, LaSalle, Peru, Marquette, etc., 98 cents to Bureau, Henry, Sankoty, Peoria, etc., $1.12 to Keller, Wyanet, etc., and $1.26 to Sheffield, Mineral Silvis, Moline, Rock Island, etc.

1771. Sand and Gravel, C. L., min. wt. capacity of car, $1.08 from Rockford, Ill., to Bruceville, Belton, Pearl City, Kent, Stockton, Woodbine, and Elizabeth, Ill., $1.13 to N. Hanover, Rodden, Winston, Rice, Aiken and Galena Junction, Ill., routed via South Freeport, Ill.

1779. Lime, C. L., from Marblehead and Quincy, Ill., Hannibal, White Bear and White Rock, Mo.;

To:	Min. wt. 24,000 lb.	Min. wt. 50,000 lb.
Federal	$0.12	$0.07
Wood River	.12	.07
Hartford	.12	.07
Roxana	.12	.07
Cotters	.12	.10
Wanda	.12	.10
Ill. Terminal Jct.	.12	.10
Edwardsville Jct.	.12	.10
Edwardsville	.12	.10

New England Association

4445. Cement, Hudson Upper, N. Y., to Erie R. R. stations on same basis as applies from Hudson, N. Y., per N. Y. C., I. C., C. N. Y. C. 13077.

4485. Lime, in barrels, min. wt. 40,000 lb. from Cheshire, Dalton, Farnams, North Adams, Refrew, Richmond, and Zylonite, Mass., to Long Island City (Queensboro Terminal), N. Y., 14½ cents. Reason: To establish same rate to Queensboro Terminal as now applies to Brooklyn contract terminals.

Southern Freight Association

9506. Cement, C. L., from Buffington, Speeds, Sellersburg, Mitchell, and Limedale, Ind., to points on I. C. in Kentucky. It is proposed to revise the present rates to be not higher than lowest combination.

9554. Sand, C. L. (applicable on shipments loaded in empty coal cars returning to mines), min. wt. 100,000 lb., except when marked capacity of car is less, in which case min. wt. will be marked capacity of car, from Electric Division stations of the Norfolk Southern to East Radford, Pulaski and Max Meadows, Va. It is proposed to establish rate of $1.63 per net ton to East Radford and Pulaski, Va. Proposed rates represent Norfolk, Va., combination in connection with Agent Kelly's I. C. C. US 1.

9603. Sand and Gravel, C. L., min. wt. 80,000 lb., from Fluker, La., to Beaumont, Echo, Orange, and Port Arthur, Texas. Combination rates apply at present. Proposed rates: To Beaumont, Echo, and Orange, 10 cents; to Port Arthur, 10½ cents per 100 lb. Basis: Same as currently applicable from Roseland, La.

9622. Slag, C. L., from Copperhill, Tenn., to Murphy, N. C., when for points beyond, present rates, 90 cents per net ton (applies to Murphy, N. C., proper,); proposed rate, 72 cents per net ton, made with relation to rates in effect to other points.

9645. Slag, C. L., from Copperhill, Tenn., to Dublin, Ga., present rate, $2.24 per net ton; proposed rate, $2.16 per net ton.

Southwestern Freight Bureau

8097. Crushed Rock, Sand and Gravel. To establish on crushed rock, sand and gravel, C. L., from Richard Spur, Okla., to points on the C. R. I. & P. in Kansas, the same mileage scale of rates as now published in Item 6644, S. W. L. Tariff 44M. Shippers contend rates proposed are necessary in order to enable them to move their traffic.

8146. Gravel, Sand and Crushed Stone. To establish rate of 6½ cents per 100 lb., from Dear, La., to Nederland, Rice Farm, Port Neeches and Griffing, Texas, on sand, gravel and crushed stone, C. L., min. wt. marked capacity of car when consigned to state, county or municipal officials for use in building good roads or streets, and when the state, county or municipality pays the weight will govern.

reduction accrues to the state, county or municipality and not to the contractor. Rate of 6½ cents is now published on these commodities from the same destinations via one line and it is desired to make the rate effective via other lines reaching the same points.

8157. Sand and Gravel. To amend Item 7230A, Supplement 15, S. W. L. Trf. 2-I, applying rates on sand and gravel from Louisiana points to Beaumont, Orange and Port Arthur, Texas, by including Fluker, La., as point of origin. Fluker is located on the main line of the Illinois Central, three miles north of Roseland, and it is claimed that rates should not be higher than in effect from Roseland.

Trunk Line Association

11267. To increase rates on Crushed Stone, C. L., minimum weight 90 per cent of marked capacity of car, except when car is loaded to cubical or visible capacity actual weight will apply, Port Deposit, Md., to Black, Goldsboro, Trappe, Md., Hartley, Del., and other points, $1.05 to $1.40 per net ton.

11281. Lime, common, hydrated, quick or slack, C. L., min. wt. O. C., Steuben, Pa., to B. & A., B. & M., M. & W. R., and St. J. & L. O., 22½ to 25 cents per 100 lb.

11282. Cement, Common, Hydraulic, Natural or Portland, C. L., min. wt. 50,000 lb., except when marked capacity of car is less, in which case the marked capacity will govern, but in no case will min. C. L. weight be less than 40,000 lb., Glens Falls and Howes Cave, N. Y., to stations on the Pennsylvania, Horsehead, N. Y., to Canandaigua, N. Y., including, 15½ cents per 100 lb.

11298. Slag, C. L., 90 per cent of marked capacity of car, except when car is loaded to cubical or visible capacity actual weight will apply, from Scanton, Pa., to D. L. & W. stations, Avondale, Berwick, Northumberland, Pa., and other points, $1.15 to $1.85 per net ton.

3057A. Sand, from Tamalco, Ill., to destinations in Groups A and B as authorized in Item 1060 of E. B. Boyd's Trf. 6K, which applies from Greenville, etc., present and Class E rates; proposed, 12½ cents per cwt., same as is published in Item 1060, Boyd's Trf. 6K, from Greenville to the same destinations. Min. wt., 90 per cent of the marked capacity of the car, except when loaded to full visible capacity, actual weight to apply; in no case less than 40,000 lb.

3089. Crushed Stone. From Keokuk, Montrose, McManus and Tuckers Siding, Iowa, to various points in Missouri. Rates, present and proposed, representative of the situation involved herein:

To:	From Keokuk, Iowa Miles	Present	Proposed
Wayland	12	$0.04	$0.03½
Ashton	25	.05	.03½
Palmyra	50	.09	.03½
Withers Mill	55	.09	.04
Glenwood Jct.	69	.06½	.04½
Guinn	74	.06½	.05
Edina	81	.11	.05½
Mendota	96.2	.08	.06
Kirksville	104	.11	.06½
Castle	124	.17	.07
Linneus	150	.10	.07½
Hale	160	.10½	.07½
Bogard	174	.10½	.08

To:	From Montrose, Iowa Miles	Present	Proposed
Wayland	24	$0.04	$0.03½
Ashton	37	.05	.03½
Palmyra	61	.09	.04½
Withers Mill	67	.09	.04½
Glenwood Jct.	80	.06½	.05
Guinn	86	.06½	.05½
Edina	92	.11	.06
Mendota	104	.08	.06
Kirksville	115	.11	.06½
Castle	135	.17	.07
Linneus	156	.10	.07½
Hale	171	.10½	.08
Bogard	186	.10½	.08½

To:	From McManus and Tuckers Siding, Iowa Miles	Present	Proposed
Wayland	19	$0.04	$0.03½
Ashton	31	.05	.03½
Palmyra	56	.09	.04
Withers Mill	62	.09	.04½
Glenwood Jct.	75	.06½	.05
Guinn	81	.06½	.05½
Edina	87	.11	.05½
Mendota	103	.08	.06½
Kirksville	110	.11	.06½
Castle	130	.17	.07
Linneus	157	.10	.07½
Hale	166	.10½	.08
Bogard	181	.10½	.08½

Min. wt. marked capacity of car except when loaded to full visible carrying space utilized, actual

Questions and Answers

Edmund Shaw, Consulting Engineer, Chicago, Ill., Expert on Problems of Screening, Washing and Hydraulic Separation

THE TECHNICAL STAFF OF ROCK PRODUCTS

Edwin Brooker, Washington, D. C., Consulting Expert on Matters of Transportation and Freight Rates

Gordon Smith, First National Bank Bldg., Chicago, Ill., Expert on Crushing and Cement-Plant Problems

No. 47. **Red Slate Granules and Chips.**—Can you advise me as to whether there is any large demand for red slate granules and chips?—L. P. D.

A. Slate granules and chips are quite largely used by manufacturers of prepared roofing, so-called, being asphalt and tar paper (or felt) roofing surfaced with these granules both in roll and shingle form. Large amounts of this roofing are now being used. The demand for these granules is approximately 100,000 tons a year. Factories making this roofing are usually near the big cities. Several Chicago manufacturers have these granules shipped from Vermont, the freight rate being about $6 or $7 a ton.—N. C. R.

No. 48. **Common Uses of Tripoli.**—I have a big bed of tripoli and want to get in touch with the markets for this product.—W. E. T.

A. The rough blocks of tripoli (a silica of organic origin) are sawed up into filter stones, while the spalls and small pieces are ground for tripoli flour, also used for filtering purposes. There has been a great increase in its production since 1885. Tripoli is used to some extent for blotter blocks and scouring bricks. Tripoli flour is used as an abrasive for general polishing, burnishing and buffing, and as an ingredient of scouring soaps. For any further details write to the U. S. Bureau of Mines, attention of Raymond B. Ladoo, who has made quite a study of this material.—N. C. R.

No. 49. **Proper Definition of "Mines" and "Quarries."**—We are confronted with a serious problem in the compilation of our mines and quarries directory. We must place each company under one of these two classifications. Our difficulty is that certain minerals fall naturally into a "twilight" zone which might be either a mine or a quarry. In this class are asbestos, mica, talc, feldspar, fluorspar, gypsum, magnesite, etc. Seemingly, these products have been labeled "mine" or "quarry" products, according to their ultimate destinations. We would appreciate the opinion of Rock Products as to how this question might best be settled.—W. L. R.

A. It is certainly a difficult thing to draw the distinction between these two words. Offhand, I should say that "mine" is the technical word for an excavation from which useful minerals are taken for any purpose whatsoever. On the other hand, I presume the word "quarry" was originally applied to open-pit operations for getting out dimension stone; technically, this is hardly a mining operation. When stone commenced to be quarried for other purposes the original quarry operators were drawn from the ranks of the dimension-stone quarrymen. Any operation for the removal of rock for any purpose thus came to be referred to as a quarry operation. Indeed, at the recent convention of the National Crushed Stone Association considerable reference was made to "underground quarries," which is an obvious misnomer. It would be legitimate to define "quarry" as any open-pit mining operation for the removal of rock other than ore or coal, although this is not a very accurate definition because calcium carbonate, magnesium carbonate, or magnesite may be technically defined as calcium or magnesium ores. This, however, is not the general definition, and I think that these definitions of "mine" and "quarry" are about the only ones that can be made.—N. C. R.

No. 50. **Wants Outlet for Limestone Deposit.**—I have two analyses of a limestone deposit owned by a company in which I am a stockholder. One analysis states that, from a composite sample, there was shown total carbonates of 51.80 per cent. The acid-soluble portion consisted mainly of alumina and iron, the amount not determined. Another sample showed the same amount of lime as the composite sample—47.78 per cent of lime carbonate, a very low grade. Another report showed that this impure limestone contained from 60 to 65 per cent of combined carbonates of lime and magnesia—the ingredients of agricultural ground limestone. Here is the analysis:

Sample No.	Silica, per cent	Iron oxide and aluminum, per cent	Carbonate of lime, per cent	Carbonate of magnesia, per cent
1	25.20	13.10	56.80	4.00
2	22.70	15.20	58.00	3.50
3	27.30	14.60	54.30	3.00
4	25.30	9.60	61.14	3.26
5	26.00	9.10	61.00	2.90
6	25.10	10.10	60.12	3.00
Average			58.56	3.28

Average total carbonates of lime and magnesia.....61.84

Can you suggest any practical outlet for the material from this deposit?—H. D. E.

A. Your deposit contains too much silica for agricultural limestone and possibly a trifle too much silica for portland cement. What you really have is a high-grade hydraulic lime which, if properly treated and handled, would prove remunerative. It is very similar to the bulk of first-class hydraulic limes, although a little low in magnesium. With other ingredients in proportion, however, this is an advantage.—W. C.

No. 51. **Estimated Costs of Quarry Operation.**—In Rock Products for December 16, 1922, Doctor Bowles gave certain estimated costs of quarry operation. For purposes of comparison I ask the following questions: 1. Were churn or air drills used in the drilling cost estimate? 2. What is the approximate height of quarry face? 3. Was the loading done by steam shovel or by hand? 4. Is the power cost distributed to various items? 5. Does cost per ton mean per ton in place or in quarry car?—J. R. T.

A. No particular quarry was in mind when the estimate was made. The figures are supposed to represent an average limestone quarry of fairly large size operating under modern conditions. Your questions may be answered more specifically as follows: 1. The figures apply to churn-drill blasting. 2. The height of the face would be from 50 to 100 ft. 3. Steam-shovel loading was contemplated, although the best modern steam-shovel practice would probably cost considerably less than 14 cents per ton. 4. The only power included in the foregoing items would be that required in drilling and loading, and this is included in the figures for questions 1 and 2. 5. The cost per ton applies to each ton of rock loaded on cars.—O. B.

No. 52. **Gravel Specifications Used by Roofing Companies.**—I wish to know the specifications for gravel used by roofing companies; also, whether these companies prepare their own gravel or purchase it from the producers.—F. M. W.

A. The standard specification for roofing gravel is clean material passing a ⅝ and retained on a ¼ mesh; in other words, a ⅛-in. material. I do not believe that any roofing company ships out any very great quantities of gravel as it is available in nearly all communities. Your screen is an ideal machine for making it and I know of several companies which are using it for that purpose. I presume that you also know that crushed slag is used for the same purpose.—N. C. R.

Western Trunk Line

1564A. Crushed Stone, C. L., from Jasper, Pipestone, Quartzite, Minn., and Sioux Falls, S. D., to Chariton, Iowa, present, no through commodity rate in effect; proposed, 12½ cents per 100 lb., min. wt. 90 per cent of marked capacity of car, except when the weight of shipment loaded to full visible capacity of car is less than 90 per cent of marked capacity of car, the actual weight will apply, but in no case less than 40,000 lb.

3057. Sand, C. L. From Tamalco, Ill., to stations Index No. 1 to 18. Item No. 1, page 9 of Boyd's Trf. 1N (Missouri river stations, Kansas City to St. Joseph, inclusive), present, where through rates are published, Class E., proposed, $2.55 per net ton, from Tamalco, Ill., to Nebraska City, Neb., Council Bluffs, Iowa, Omaha and South Omaha, Neb.; present, Class E, 26 cents per 100 lb.; proposed, $3.10 per net ton. Min. wt. 90 per cent of the marked capacity of car except when loaded to full visible capacity, actual weight.

3069. Cement, Hydraulic, Portland or Natural, C. L., from Bonner Springs, Kan., to Argentine, Morris, and Halliday, Kan., present, to Argentine 8½ cents, Turner, Morris and Holliday 8 cents; proposed, to all points, 6½ cents, min. wt. 50,000 lb.

3072. Stone, Crushed or Ground, C. L., from Marquette, Mich., to Kansas City, Mo., present $4.30 per net ton, combination on Bagdad, Mich., 73 cents to Bagdad, $3.87 beyond, subject to Kelly Combination Trf. making through rate $4.30; proposed, $3.87 per net ton, min. wt., 40,000 lb.

Quarried from Life

By Liman Sandrock

One of Our Industry's Pioneers

SAYS Martial in one of his immortal epigrams: "The good man prolongs his life; to be able to enjoy one's past life is to live twice." We had this epigram in mind while interviewing F. H. King, veteran sales manager of the Marion Steam Shovel Co.

It's not stretching the imagination to say that Mr. King has "lived twice" if we take into consideration his wide and varied experience and his enjoyment of long years in the service of the Marion company.

He started with them back in 1885, and is the oldest employe in point of service connected in any way with that organization at the present time. In the early days there were only 10 or 12 men in the plant organization; they were days when a fellow just had to be a Handy Andy to be of any value.

Mr. King helped to build the first dipper dredge, which was sold to N. W. Irish, at Centerville, Ill., near East St. Louis. He had *some* job! For he not only erected the machine and operated it until it was accepted, but he also had to bring home the money!

In view of the giant strides dredge development has made, it is most interesting to give a moment's study to our picture of this particular dredge. Here you will find Mr. King at the throttle, derby hat on head, alert, and keen to drop that bucket of dirt where it will do the most good. That "coal pile" is not what we look for today, but it did the trick then.

This dredge's hull was 12 ft. wide, 25 ft. long and 2 ft. deep, and carried a half-yard dipper. Possibly it weighed 8 to 12 tons, which is in striking contrast to the present-day dredges.

Of course, when Mr. King started to drain a swamp at Centerville with this dredge, it excited considerable attention from the natives thereabouts. They came in crowds; some courteous and others decidedly inquisitive. When the latter became too persistent, Mr. King would innocently drop a dipperful of soft mud, water, and slush near them—and you can easily imagine that his arm developed a mean squelch. But, saith the Book of Proverbs: "As a dog returneth to his vomit, so a fool returneth to his folly," and other poor fish would return to the bait, and the "operation" had to be repeated.

This little dredge's hull was so small that it had hardly sufficient displacement to carry the machine's weight when the spuds were raised. Mr. King had to wear boots when running the dredge and step up on a platform whenever the machine moved ahead. In the following year two ¾-yd. dredges were built with vertical spuds. As one of the dredges was started in a winter month

F. H. King, sales manager the Marion Steam Shovel Co.

the ice caused the crew considerable difficulty in getting the spuds released properly.

One day the mechanism slipped and the projecting lever caught on the underside of Mr. King's vest and gently lifted him over the side and dropped him into six feet of water and ice. (These spud levers are shown in the picture.) To get the real feel of this happening, you should hear Mr. King relate the incident. He will never forget it.

He later worked in and out of the shop assisting in erecting shovels. His only instructions were: "Go out and start the machine; make it operate satisfactorily—and stay there until you get the money!"

Mr. King then went into the sales department and was constantly on the road for the next 10 years. His territory? All over these United States, Canada, and Mexico! You remember the panic of 1893? How next to impossible it was to get enough money to carry on business?

He says cash was so scarce that a fellow couldn't even draw his own money out of the bank. It was almost impossible to sell shovels at any price. At this time he and another official of the company went to Montreal and sold a shovel for cash. Then they secured the payment in gold and expressed it home to Marion to meet a payroll rather than have it handled through the banks. This was Panic with a big P!

Along about 1897 business began to pick up and boom times followed. Then it was that Mr. King actually cashed in on his extensive missionary work. In 1910 he was made sales manager. During his administration the office list has grown to 23 district offices and sales representatives in this country and Canada, with branches in many foreign countries.

Mr. King is enjoying good health and is busy at his desk every business day. "From present indications," declares Harvey Gracely, his friend and fellow worker, "Mr. King is good for 20 years more."

We met Mr. King during the last National Crushed Stone convention and felt proud to grasp him by the hand. We know that many others felt the same way, and that they will join us in wishing Mr. King years of content, satisfaction with striving, and reward for faithful and successful service.

AN ARKANSAS WOMAN has recently cremated her third hubby. Presumably kilned by rotation, eh?

SAND AND GRAVEL MEN, your president has a little son, Alex. W., Jr.! Our felicitations to Mrs. Dann and Alex. W.!

Back in the days of the first dipper dredge. Mr. King stands at the throttle, ready to drop that bucket of dirt

Editorial Comment

One Value of Publicity

On the editor's desk are six or seven newspaper clippings from the Carthage, Mo., *Press* of March 24 describing and illustrating as many quarry and gravel plant operations in that locality. The articles are unusually well written for newspaper "copy" and show evidence of active co-operation on the part of the producers in getting the articles prepared. The general inference is: "We have *some* town and here are the industries that make us *it*."

There is not enough of this kind of publicity for the sand, gravel, quarry and lime industries. Probably rock products operators too frequently overlook its real value—the intangible value based on psychology.

We recall an advertising and publicity campaign once carried through by a Texas city water company to overcome prejudice against a privately owned water-works and consequently the agitation for a municipally-owned plant. The company ran informative ads in the local papers telling about the plant, its problems, the necessity of water meters, the vigilance to keep the supply pure, and numerous other really interesting and instructive but little appreciated details. The newspapers took it up and got some good "copy" with the co-operation of the company.

The most unlooked-for and most valuable result was the effect on the company's own employes. In a general way they knew all these things, or at least they should have known them. But seeing such facts in the public print "sold" them. Soon the company's own employes were observed to be driving home the printed arguments in their own private conversations. They took considerable pride in being connected with the water company and thus being in a position to explain in more detail a matter of such public interest. A notable *esprit-de-corps* was evident.

And so it always is. All of us like to connect ourselves with public characters and everything else in the public eye. We are never ashamed of belonging to an organization that attracts some public interest. Maybe if the rock products industry did a little more of this kind of work in selling its own workers on their jobs, it would not be so hard as it is now to find workers.

A Short Labor Supply

About the worst thing that can happen to industry—to producers in every branch of industry—is a runaway labor market. Under such conditions cost keeping for price-making purposes becomes impossible and an operator has to gamble. If he has sewed up the biggest part of his production in long-term contracts at prices made early in the season, he is out of luck. On the other hand, if he increases prices to keep pace with increasing costs, he is adding his bit to the inflation bubble which must eventually burst—and the bigger it is the more damage when it necessarily does burst.

After so recent an experience as the year 1920 most producers—employers—have learned how very easy it is to overwork a good thing, and how disastrous the consequences may be to business in general, and to the construction industry in particular. In other words, to take the utmost advantage of a temporary buyers' market is not good business if one expects to continue doing business under other market conditions in the future.

But the element employers can't control in times like these is labor cost. Probably this is partly because of the general ignorance of workmen of the economic factors and forces involved, but largely is the result of the employer's own attitude of considering labor as a mere commodity, to be bought when desired and let out when not wanted, thus creating that floating supply of labor with its intermittent employment, which is both a social and an industrial menace and handicap.

The answer is, of course, to make all employment conditions as stable as possible and cut down the floating element—the shifters—who under conditions like the present can run up labor costs to impossible figures. Every employer must do his part to eliminate intermittent labor conditions; even the construction industry has already accomplished much.

A change in the immigration laws would remedy matters only temporarily—necessary as such a change is, if it could be made immediately. But as long as an industry is so organized and conducted that it must depend in a large measure on a floating labor supply, just so long will it also be subject to a corner in the labor market. And the more enlightened and experienced common labor becomes, the more capable it becomes of taking advantage of such a corner, unless all can be educated to the point of seeing its ultimate futility. Every wise manufacturer tries to fortify himself against a corner in the raw materials he uses, but a great many have a lot to learn about guarding against a corner in floating labor supply.

So far as rock products producers are concerned there is much room for improvement. Machines must more and more take the place of common labor, and skilled employes with permanent employment must take the place of floaters. Living and social conditions at plants must be made such that this kind of employe can and will get married, have a family and stick. The employers who are farsighted enough to foresee this trend of industry are the ones who will profit most in the long run, because in a large measure they will free themselves from one of their biggest problems—and a constantly recurring one.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Blakeslee, N. Y.	1.00	1.25	1.10	1.10	1.10	.....
Buffalo, N. Y.			1.50 per net ton all sizes			
Chaumont, N. Y.	1.00	.....	1.75	1.50	1.50	1.50
Cobleskill, N. Y.	1.25	1.25	1.25	1.25	1.25	.....
Coldwater, N. Y.			1.50 per net ton all sizes			
Eastern Penna.	1.35	1.35	1.35	1.35	1.35	1.35
Munns, N. Y.	1.00	1.40	1.40	1.30	1.30	.....
Prospect, N. Y.	.80	1.30	1.40	1.30	1.30	.....
Walford, Pa.	1.55	1.55	1.55	1.55	1.55	1.55
Watertown, N. Y.	1.00	.....	1.50	1.25	1.25	1.25
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Alton, Ill.	1.75	.....	1.50	1.35	.....	.....
Buffalo, Iowa	.70	.....	1.25	1.05	1.10	1.10
Bloomville, Middlepoint, Dunkirk, Bellevue, Ohio	1.00	1.10	1.10	1.00	1.00	1.00
Chasco, Ill.	1.30	1.25	1.25	1.25	1.20	.....
Chicago, Ill.	1.10	1.50	1.10	1.10	1.10	1.10
Dundas, Ont.	1.00	1.35	1.35	1.35	1.10	1.10
Greencastle, Ind.	1.25	1.10	1.00	.90@1.00	.90@1.00	.90@1.00
Krause, Columbia and Valmeyer, Ill.	1.00@1.30	1.00@1.30	1.00@1.30	1.00@1.30	1.00@1.30	1.30@1.50
Lannon, Wis.	.80	1.05	1.05	.95	.95	.95
Mitchell, Ind.	1.00	1.00	1.00	1.00	1.00	1.00
Montreal, Canada	.80	1.35	1.05	.95	.90	.....
Montrose, Iowa	.....	1.50	1.60	1.55	1.45	1.40
Sheboygan, Wis.	1.10	1.10	1.10	1.10	.....	.....
Southern Illinois	1.35	1.25	1.25	1.25	1.20	.....
Stolle, Ill. (I. C. R. R.)	1.30	.....	1.35	1.35	1.35	1.35
Stone City, Iowa	.75	.....	1.50	1.40	1.35	.....
Toledo, Ohio	1.60	1.70	1.70	1.70	1.60	1.60
Toronto, Canada	1.90	2.25	2.25	2.25	2.00	2.00
			Prices include 90c freight			
Waukesha, Wis.	1.00	1.00	1.00	1.00	1.00	1.00
SOUTHERN:						
Alderson, W. Va.	.75	1.25	1.40	1.25	1.15	.....
Bridgeport, Texas	1.40	1.40	1.40	1.40	1.40	1.25
Bromide, Okla.	.75	2.00	1.75	1.60	1.50	1.25
Cartersville, Ga.	.....	1.75	1.75	1.25	1.25	.....
Chickamauga, Tenn.	1.00@1.10	1.00@1.10	.....	.90@1.10	.90@1.10	.....
El Paso, Texas	1.00	1.00	1.00	1.00	.....	.....
Ft. Springs, W. Va.	.80	1.20	1.40	1.35	1.25	.....
Garnet and Tulsa, Okla.	.50	1.60	1.60	1.45	1.45	.....
Ladds, Ga.	.....	.....	1.40	1.40	1.40	.....
Morris Spur (near Dallas), Tex.	1.25	1.25	1.40	1.40	1.40	1.25
WESTERN:						
Atchison, Kans.	.50	1.80	1.80	1.80	1.80	1.80
Blue Spr'gs and Wymore, Neb.	.20	1.55	1.55	1.45	1.35	1.30
Cape Girardeau, Mo.	1.35	.....	1.10	1.35	1.10	.....
Kansas City, Mo.	1.00	1.50	1.50	1.50	1.50	1.50

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.50	1.30	1.10	1.00	.....
Bound Brook, N. J.	1.90	2.50	2.10	1.70	1.60	.....
Dresser Jct., Wis.	1.00	2.25	.....	1.75	2.00	.....
Duluth, Minn.	.90@1.00	2.25	1.75@2.00	1.35	1.35	1.35
E. Summit, N. J.	2.30	2.50	2.20	1.90	1.60	.....
Eastern Massachusetts	.85	1.75	1.75	1.40	1.40	1.40
Eastern New York	.75	1.50	1.50	1.30	1.40	1.30
Eastern Pennsylvania	1.25	1.55	1.50	1.40	1.40	1.40
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60	1.50@2.00	1.35@1.50	1.15@1.25	1.00@1.10	.....
Oakland, Calif.	1.75	1.75	1.75	1.75	1.75	.....
Richmond, Calif.	.50*	.....	1.50*	1.50*	1.50*	.....
Spring Valley, Calif.	.70	1.55	1.50	1.40	1.35	1.35
Springfield, N. J.	2.00	2.20	2.00	1.75	1.60	1.60
Westfield, Mass.	.60	1.35	1.25	1.10	1.00	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Atlanta, Ga.—Granite	1.47	2.07	2.07	1.97	1.97	.....
Buffalo, N. Y.—Granite	.90	.....	1.20	1.00	1.05	1.10
Berlin, Utley and Red Granite, Wis.	1.60	1.70	1.60	1.50	1.40	.....
Columbia, S. C.—Granite	.50	.....	2.00@2.50	2.00	.....	1.75@2.00
Dundas, Ont.—Limestone	1.00	1.35	1.35	1.25	1.10	1.10
Eastern Penna.—Sandstone	.85	1.60	1.55	1.35	1.35	1.30
Eastern Penna.—Quartzite	1.20	1.35	1.20	1.20	1.20	1.20
Lithonia, Ga.—Granite	1.00	.....	1.50	1.25	1.00	1.00
Lohrville, Wis.—Cr. Granite	1.35	1.40	1.30	.....	1.20	.....
Middlebrook, Mo.—Granite	3.00@3.50	.....	2.00@2.25	2.00@2.25	.....	1.25@1.75
San Diego, Calif.	.50@ .70	1.45@1.75	1.40@1.70	1.30@1.60	1.25@1.55	1.25@1.55
Sioux Falls, S. D.—Granite	1.00	1.60	1.55	.....	1.50	.....

*Cubic yard. †Agrl. lime. ||R.R. ballast. §Flux. ‡Rip-rap, a 3-inch and less.

Agricultural Limestone
(Pulverized)

Chaumont, N. Y.—Analysis, 95% $CaCO_3$, 1.14% $MgCO_3$—Thru 100 mesh; sacks, 4.00; bulk	2.50
Grove City, Pa.—Analysis, 94.89% $CaCO_3$, 1.50% $MgCO_3$; 60% thru 100 mesh; 45% thru 200 mesh; 100% thru 20 mesh; sacks, 5.00	3.50
Hillsville, Pa.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$, 75% thru 100 mesh; sacks, 5.00; bulk	3.50
Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk	2.50
New Castle, Pa.—89% $CaCO_3$, 1.4% $MgCO_3$—75% thru 100 mesh, 84% thru 50 mesh, 100% thru 10 mesh; sacks, 4.75; bulk	3.06
Walford, Pa.—Analysis, 50% thru 100 mesh; 4.50 in paper; bulk	3.00
Watertown, N. Y.—Analysis, 96% $CaCO_3$; .02% $MgCO_3$; 90% thru 100 mesh; bulk, 2.50; sacks	4.00
West Stockbridge, Mass., Danbury, Conn., North Pownal, Vt.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.25—cloth, 4.75; bulk	3.00
Alton, Ill.—Analysis, 97% $CaCO_3$, 0.1% $MgCO_3$; 90% thru 100 mesh	6.00
Belleville, Ont.—Analysis, 90.9% $CaCO_3$, 1.15% $MgCO_3$—45% to 50% thru 100 mesh, 61% to 70% thru 50 mesh; bulk	2.50
Chasco, Ill.—Analysis, 96.12% $CaCO_3$, 2.5% $MgCO_3$; 90% thru 100 mesh	5.00
90% thru 50 mesh	1.35
Detroit, Mich.—Analysis, 88% $CaCO_3$, 7% $MgCO_3$—75% thru 200 mesh, 2.50@4.75—60% thru 100 mesh	1.80@3.80
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80-lb. paper sacks	5.00
Bulk	3.50
Piqua, Ohio—100% thru 100 mesh; bulk, 5.50; bags	7.00
50% thru 100 mesh; bulk, 2.10; bags	2.25
80% thru 100 mesh; bulk, 3.50; bags	5.00
Yellow Springs, Ohio—Analysis, 96.08% $CaCO_3$, 63% $MgCO_3$; 32% thru 100 mesh; 95.57%, sacked. 6.00; bulk	4.25
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; 50% thru 100 mesh	1.50
Hot Springs, N. C.—50% thru 100 mesh; sacks, 4.25; bulk	2.70
Knoxville, Tenn.—80% thru 100 mesh	2.70
80% thru 200 mesh	3.50
(Bags 1.25 extra)	
Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; bulk	2.75
Mountville, Va.—Analysis, 76.60% $CaCO_3$, 22.83% $MgCO_3$—50% thru 100 mesh; 100% thru 20 mesh; sacks	5.00
Colton Calif.—Analysis, 95% $CaCO_3$, 3% $MgCO_3$—all thru 20 mesh—bulk	4.00
Lemon Cove, Calif.—Analysis, 94.8% $CaCO_3$, 0.42% $MgCO_3$; 60% thru 200 mesh; sacks, 5.25; bulk	4.50

Agricultural Limestone
(Crushed)

Alton, Ill.—Analysis, 98% $CaCO_3$, 0.1% $MgCO_3$; 90% thru 50 mesh	1.50
Bellevue, Ohio—Analysis, 61.56% $CaCO_3$, 36.24% $MgCO_3$; ¼ in. to dust, about 20% thru 100 mesh	1.25
Bettendorf, Iowa, and Moline, Ill.—97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.25
Buffalo, Iowa—90% thru 4 mesh	1.00
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; 100% thru 10 mesh, 90% thru 50 mesh	1.50
90% thru 4 mesh, cu. yd	1.35
Chicago, Ill.—Analysis, 53.63% $CaCO_3$, 37.51% $MgCO_3$; 90% thru 4 mesh	.80
Columbia, Ill., near East St. Louis—½-in. down	1.25@ 1.80
Elmhurst, Ill.—Analysis, 35.73% $CaCO_3$, 20.69% $MgCO_3$; 50% thru 50 mesh	1.25
Huntington and Bluffton, Ind.—Analysis, 61.56% $CaCO_3$, 36.24% $MgCO_3$; about 20% thru 100 mesh	1.25

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Agricultural Limestone

(Continued from preceding page)

Greencastle, Indiana.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh	2.00
Kansas City, Mo.—50% thru 100 mesh	1.50
Krause and Columbia, Ill.—Analysis, 90% $CaCO_3$, 90% thru 4 mesh	1.20
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; screenings, 40% thru 100 mesh, 53% thru 50, 60% thru 100 mesh, 70% thru 50 mesh, 100% thru 10 mesh; sacks, 5.00; bulk	1.25
Milltown, Indiana.—Analysis, 94.41% $CaCO_3$, 2.95% $MgCO_3$; 33.6% thru 100 mesh, 40% thru 50 mesh	3.50
Mitchell, Ind.—Analysis, 97% $CaCO_3$, 1% $MgCO_3$; 50% thru 100 mesh, 90% thru 4 mesh	1.25@ 1.65
Montrose, Iowa.—90% thru 100 mesh	1.25
Narlo, Ohio.—Analysis, 56% $CaCO_3$, 43% $MgCO_3$; limestone screenings, 37% thru 100 mesh, 55% thru 50 mesh, 100% thru 4 mesh	1.25
Ohio (different points), 20% thru 100 mesh, bulk	1.50@ 2.00
Piqua, Ohio—100% thru 4 mesh	1.25@ 1.50
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	1.55
Stolle, Ill., near East St. Louis on I. C. R. R.—Thru ⅛-in. mesh	.80@ 1.40
Stone City, Iowa.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh	1.30
Toledo, Ohio.—¼ in. to dust, 30% thru 100 mesh	.75
Waukesha, Wis.—No. 1 kiln dried	1.50
No. 2 Natural	2.00
Alderson, W. Va.—Analysis, 90⅓ $CaCO_3$; 90% thru 50 mesh	1.75
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$	1.75
90% thru 4 mesh	2.00
Cartersville, Georgia.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$—all passing 10 mesh	1.50
Claremont, Va.—Analysis, 92% $CaCO_3$, 2% $MgCO_3$; 90% thru 50 mesh	1.75
50% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh	3.00
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh	2.75
Ladds, Ga.—50% thru 50 mesh	1.50
Garnett, Okla.—Analysis, 80% $CaCO_3$, 3% $MgCO_3$; 50% thru 50 mesh	2.00
Kansas City, Mo., Corrigan Siding—50% thru 100 mesh; bulk	.50
Tulsa, Okla.—90% thru 4 mesh	1.80
	.50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

Glass Sand:	
Berkeley Springs, W. Va.	2.00@ 2.25
Cedarville and South Vineland, N. J.—Damp, 1.75; dry	2.25
Cheshire, Mass.—Damp	2.50
Columbus, Ohio	1.50@ 2.00
Dunbar, Pa.—Damp	2.50
Falls Creek, Pa.	2.25
Hancock, Md.—Damp, 1.50; dry	2.00
Klondike and Pacific, Mo.	2.00@ 2.50
Mapleton, Pa.	2.25@ 2.50
Mapleton Depot, Pa.—Dry	2.75
Massillon, Ohio	3.50
Michigan City, Ind.	.50@ .55
Millville, N. J.—Wet, 1.75; dry	2.25
Mineral Ridge, Ohio	3.00
Montoursville, Pa.	2.00
Oregon, Ill.	2.50
Ottawa, Ill.	2.50
Pittsburgh, Pa.—Dry, 4.00; damp	3.00
Rockwood, Mich.	2.50@ 2.75
Round Top, Md.	2.25@ 2.50
Sands, Pa.	2.50
San Francisco, Calif.	3.00@ 3.50
St. Louis, Mo.	1.25@ 2.50
St. Mary's, Pa.	3.00
Thayers, Pa.	2.50
Utica, Ill.	1.75
Zanesville, Ohio	2.00@ 2.50
Foundry Sand:	
Albany, N. Y.—Molding fine, coarse and brass molding	2.25
Sand blast (kiln dried)	2.75@ 4.00
Allentown, Pa.—Core and molding fine	1.75@ 2.00
Arenzville, Ill.—Molding fine	1.50@ 1.75
Brass molding	1.75@ 2.00
Beach City, Ohio.—Core, washed and screened	2.00@ 2.50
Furnace lining	2.50@ 3.00
Molding fine and coarse	2.25@ 2.50
Cheshire, Mass.—Furnace lining, molding fine and coarse	5.00
Sand blast	5.00@ 8.00
Stone sawing	6.00
Cleveland, Ohio.—Molding coarse	1.50@ 2.00
Brass molding	1.50@ 2.00
Molding fine	1.50@ 2.25
Core	1.25@ 1.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, f.o.b., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge and So. Heights, Pa.	1.25	1.25	1.25	.85	.85	.85
Buffalo, N. Y.	1.10	.95			.85	
Erie, Pa.	.75		.90		1.10	
Farmingdale, N. J.	.48	.48	.75	1.10	1.10	
Hartford, Conn.	.90		1.25	1.15	1.15	1.15
Leeds Junction, Me.		.50	1.75	1.35	1.35	1.25
Machias, N. Y.	.85	.75	.95	.85	.85	.85
Pittsburgh, Pa.	1.25	1.25	1.25	.85	.85	.85
Portland, Me.		.50	1.75		1.35	1.35
Washington, D. C. (Rewashed, river)	.75	.75	1.60	1.40	1.20	1.20
CENTRAL:						
Alton, Ill.		.85				
Anson, Wis.	.50	.40				.90
Barton, Wis.	.60	.60	.70	.70	.70	.70
Beloit, Wis.		.70			.80	
Chicago, Ill.		1.75@2.23	1.75@2.43			
Cincinnati, Ohio	.70	.65	.90	.90	.90	.90
Columbus, Ohio	.75@1.00	.75@1.00	.65@1.00	.75@1.00	.75@1.00	.75@1.00
Des Moines, Iowa	.50	.50	1.60	1.60	1.60	1.60
			Unwashed ballast, .50 ton			
			60-40 sieves, .85; pebbles, .95			
Dresden, Ohio	.70	.60	.60		.90	
Earlestead (Flint), Mich.	.70					
Eau Claire, Wis.	.40	.40@ .45	1.00@1.25			.85@ .90
Elkhart Lake, Wis.	.66	.60	.80	.76	.70	.70
Ft. Dodge, Iowa		1.22		2.17		
Grand Rapids, Mich.		.50		.80	.70	
Hamilton, Ohio		.90			.90	
Hawarden, Iowa	.60	.50			1.60	
Hersey, Mich.	.50	.50			.75	.75
Indianapolis, Ind.	.60	.60		1.50	.75@1.00	.75@1.00
Janesville, Wis.		.65@ .75			.65@ .75	
Mason City, Iowa	.65	.65	1.75		.175	1.65
Mankato, Minn. (pit run)	.60	.50			1.35	
Milwaukee, Wis.	1.11	1.11	1.36	1.36	1.36	1.36
Minneapolis, Minn.	.35	.35	1.25@1.35	1.25@1.35	1.25	1.25
Moline, Ill.	1.00	1.00	1.30	1.30	1.30	1.30
Riton, Wis.		.40			.60	
St. Louis, Mo., f.o.b. cars	1.20	1.45		1.45		1.45
St. Louis, Mo., deliv. on job	2.05	2.20	2.35	2.15		2.10
Summit Grove, Clinton, Ind.	.65@ .75	.60@ .75	.60@ .75	.60@ .75	.60@ .75	.60@ .75
Terre Haute, Ind.	.75	.60	1.00	.75	.75	.75
Waukesha, Wis.	.50	.50	.80	.80	.80	.80
Winona, Minn.	.50	.50	1.25	1.25	1.10	1.10
			(.05 ton discount 10 days)			
SOUTHERN:						
Atlanta, Ga.	.75	.75		.90	.90	.90
Birmingham, Ala.	1.48		all gravel 1.88			
Charleston, W. Va.	all sand 1.40		all gravel 1.50			
Estill Springs, Tenn.	1.35	1.35		1.00	.85	.65
Ft. Worth, Texas	1.75	1.75	1.75	1.75	1.75	1.75
Jackson's Lake, Ala.	.50@ .60	.50@ .60	.40@1.00	1.00	.50@1.00	.50@1.00
Knoxville, Tenn.	1.00	1.00	1.00	1.00	1.00	1.00
Lake Weir, Fla.		.60				
Macon, Ga.		.50@ .75				
Memphis, Tenn.	1.00	1.00	1.80	1.80	1.80	1.80
N. Martinsville, W. Va.	1.00	1.00		1.20	1.00	.80
New Orleans, La.	.25			.85		
Roseland, La.	.50		.85	.85		
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Kansas City, Mo.			(Kaw river sand, car lots, .75 per ton; Missouri river, .85)			
Los Angeles, Calif.		.70	1.20	1.20	1.10	1.10
Pueblo, Colo.	1.10*	.90*		1.50*		
San Diego, Calif.†	.50@ .70	.80@1.00	1.30@1.80	1.35@1.65	1.10@1.40	1.10@1.40
San Francisco, Calif.		1.00	1.00@1.20	.85@1.00	.85@1.00	.85@1.00
Seattle, Wash.	1.00*	1.00*	1.00*	1.00*		1.00*
Spring Valley, Calif.	.70	.80	1.40	1.35	1.25	1.25

Bank Run Sand and Gravel

City or shipping point	Fine sand, 1/10 in.	Sand, ¼ in.	Gravel, ½ in.	Gravel, 1 in.	Gravel, 1½ in.	Gravel, 2 in.
Atlanta, Ga.	.30@ .40	.30@ .40				
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Cape Girardeau, Mo.			River sand, .80 per yd.			
Cherokee, Iowa			.80 per ton—1.20 washed			
Dresden, Ohio		.60				
Dudley, Ky. (crushed sand)	1.00	1.00		.90		
East Hartford, Conn.			.65 per cu. yd.			
Elkhart Lake, Wis.	.70	.50			.60	.60
Estill Springs, Tenn.						.85
Fishers, N. Y.		.50@ .65		.50@ .65		
Grand Rapids, Mich.						.50
Hamilton, Ohio			.55 per cu. yd. in pit			
Hartford, Conn.		1.00*				
Hersey, Mich.				.55		
Indianapolis, Ind.			Mixed gravel for concrete work, .65			
Lindsay, Texas			1.00			.55
Janesville, Wis.		.65			.65@ .75	
Montezuma, Ind.			Road gravel .50 per ton			
Pine Bluff, Ark.			Road gravel .50			
Rochester, N. Y.	.60@ .75	.60@ .75			.50@ .65	.50@ .65
Roseland, La.		.75				
Saginaw, Mich., f.o.b. cars		.75	1.30	1.30	1.30	1.30
St. Louis, Mo.			Bank run gravel 1.55			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waco, Texas		.80		1.50		1.30
Winona, Minn.			Clean pit run .60			
York, Pa.		1.00@1.20	(crushed rock sand)			

* Cubic yard. B Bank. L Lake. || Ballast. † Low prices, wholesale; high prices, retail.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
E. Canaan, Conn.	4.00	1.00	2.50	1.35	1.25	1.15	1.15
Eastern Penn. and Northern N. J.	2.00	1.20	1.50	1.20	1.20	1.20	1.20
Easton, Pa.	2.50	.80	1.25	.90	.85	.80	.80
Erie, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Emporium, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Sharpsville and West Middlesex, Pa.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
Western Penn.	2.00	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Chicago, Ill.			All sizes, 1.50, f.o.b. Chicago				
Detroit, Mich.			All sizes, 1.65, f.o.b. Detroit				
Ironton, O.	2.05	1.45	1.75	1.45	1.45	1.45	1.45
Steubenville, O.	2.00	1.40	1.70	1.40	1.40	1.40	1.40
Toledo, O.	1.50	1.35	1.35	1.35	1.35	1.35	1.35
Youngstown, Dover, Hubbard, Leetonia, Struthers, O.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
Steubenville, Lowellville, Canton, O.	2.00	1.35	1.60	1.35	1.35	1.35	1.35
SOUTHERN:							
Ashland, Ky.		1.55		1.55	1.55	1.55	1.55
Birmingham, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Ensley, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Longdale, Goshen, Glen Wilton and Low Moor, Roanoke, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.05

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Adams, Mass.			7.00				2.90	
Bellefonte, Pa.		10.50§	10.50§	10.50§	9.00		8.50	1.80
Buffalo, N. Y.				12.00				
Berkeley, R. I.			12.00					2.30
Cassadaga, N. Y.			Agricultural marl 7.00@10.00					
Chaumont, N. Y.					2.50	4.00		
Lime Ridge, Pa.							5.00	
West Rutland, Vt.	13.50	12.00					11.00	3.20
West Stockbridge, Mass.								2.25
Williamsport, Pa.			10.00			10.00	6.00	
York, Pa. (dealers' prices)		10.50	10.50					
Zylonite, Mass.	3.20d	2.90d	7.00					
CENTRAL:								
Cold Springs, Ohio	11.50	10.00	10.00		8.00	10.00	9.00	
Delaware, Ohio	11.50	10.00	9.50				9.00	1.60
Gibsonburg, Ohio	11.50	10.00	10.00		8.00	10.00	9.00	
Huntington, Ind.		10.00	10.00		8.00		9.00	
Luckey, Ohio		12.50a	10.00a		9.00			
Marblehead, Ohio		10.00	10.00				9.00	1.60
Marion, Ohio		10.00	10.00				9.00	
Mitchell, Ind.				12.00	11.00		10.00	1.60
Sheboygan, Wis.								7.50d
White Rock, Ohio	11.50				8.00	10.00		
Woodville, O. (dlrs.' price)	12.50a	11.00a	10.50a		9.00		10.00	1.60
SOUTHERN:								
Erin, Tenn.							8.50	1.50
El Paso, Tex.							7.00	1.50
Karo, Va.							7.00	
Knoxville, Tenn.	12.50	11.00		11.00			9.00	1.50
Ocala and Zuber, Fla.	13.00		12.00				12.00	1.60
Sherwood, Tenn.	12.50	11.00	11.00	11.00			8.50	1.50
Staunton, Va.					4.50	5.50	8.50	1.35
WESTERN:								
Colton, Calif.			15.00				19.70	
Kirtland, N. M.							15.00	
San Francisco, Calif.	21.00	21.00	15.00	21.00				2.15*
Tehachapi, Calif.							13.00	2.00

‡100-lb. sacks; *180-lb. net, price per barrel; †180-lb. net, non-returnable metal barrel; §paper sacks. (a) 50-lb. paper bags; terms, 30 days net, 25c per ton or 5c per barrel discount for cash in 10 days from date of invoice; (b) burlap bags; (c) 200-lb. barrels; (d) 280-lb. barrels net.

Miscellaneous Sands

(Continued from preceding page)

Delaware, N. J.—Molding fine	2.00
Molding coarse	1.90
Brass molding	2.15
Dunbar, Pa.—Traction, damp	2.50
Dundee, Ohio.—Glass, core, sand blast traction	2.50
Molding fine, brass molding (plus 75c for winter loading)	2.00
Molding coarse (plus 75c for winter loading)	1.75
Eau Claire, Wis.—Core	1.00@ 1.25
Sand blast	3.25@ 3.75
Falls Creek, Pa.—Molding, fine and coarse	1.75
Sand blast	2.00
Traction	1.75
Franklin, Pa.—Core	2.00
Furnace lining	2.50
Molding fine and coarse	2.00
Brass molding	2.00
Greenville, Ill.—Molding coarse	1.50@ 1.75
Joliet, Ill.—No. 2 molding sand and loam for luting purposes; milled	.80
Bank run	.65
Kansas City, Mo.—Missouri river core	.80
Kasota, Minn.—Molding fine	1.60@ 1.85
Molding coarse, stone sawing	1.45@ 1.75
Klondike, Pacific, Gray Summit, Mo.—Molding fine, core, sand blast, stone sawing	2.00
Mapleton, Pa.—Glass, core, furnace lining, molding fine and coarse; damp, 2.00; dry	2.75
Massillon, Ohio—Molding fine and coarse, furnace lining, core	3.00
Traction	2.75
Michigan City, Ind.—Core, traction	.40@ .45
Mineral Ridge, Ohio.—Core (green)	2.25
Furnace lining, molding fine and coarse; roofing sand, sand blast, stone sawing, traction brass molding (green)	2.00
Montoursville, Pa.—Core	1.35@ 1.40
Traction	1.00@ 1.10
Brass molding	1.25
New Lexington, Ohio.—Molding fine	2.00
Molding coarse	1.75
(.75 extra per ton for winter loading)	
Oregon, Ill.—Core	1.50@ 2.00
Sand blast	4.00
Stone sawing	2.00@ 2.50
Ottawa, Ill.—Core, molding, steel, traction, roofing sand	2.00
Brass molding	3.00
Sand blast	4.00
Stone sawing	3.50
Furnace lining, molding coarse, crude	.85@ 1.00
Ottawa, Minn.—All crude silica sand	.75@ 1.00
Rockwood, Mich.—Core	1.90@ 2.50
Roofing	2.75
Sand blast	3.75
Round Top, Md.—Core	1.60@ 1.75
Traction	1.75
Sand blast	2.00@ 2.50
Columbus, Ohio.—Core	.50@ 1.50
Sand blast	3.50@ 5.00
Molding fine	2.75@ 3.00
Molding coarse	2.50@ 3.00
Brass molding	2.50@ 3.00

Miscellaneous Sands

(Continued)

San Francisco, Calif. (washed and dried)—Core, molding fine, roofing sand and brass molding	3.00@ 3.50
(Direct from pit)	
Furnace lining, molding coarse, sand blast	3.60
Stone sawing, traction	2.30
St. Louis, Mo.—Red heavy molding	1.50@ 2.25
Red fine	1.50@ 2.00
Molding fine and brass	2.00@ 3.00
Skein core	1.50@ 2.00
White core sand	1.00@ 1.75
Sand blast	2.00@ 4.00
Furnace lining	1.50@ 2.50
Thayers, Pa.—Core and traction	2.00
Furnace lining	1.25
Molding fine and coarse	1.10
Utica, Ill.—Core	.85@ 1.00
Furnace lining (crude and dry)	1.00@ 1.75
Molding fine and coarse (crude and dry	.85@ 1.75
Roofing sand	1.75
Sand blast	2.50@ 3.50
Stone sawing	2.50
Traction	1.50@ 1.75
Brass molding (crude and dry)	1.00@ 1.75
Utica, Ill.—Core, furnace lining, brass molding	1.00@ 1.75
Molding fine and coarse	.85@ 1.75
Roofing sand and traction	1.75
Sand blast	2.50@ 3.00
Stone sawing	1.75@ 2.50
Warwick, Ohio.—Core, furnace lining, molding, fine and coarse, traction, dry, 2.75; green	2.00
Brass molding, dry	2.50
Zanesville, Ohio.—Molding fine, brass molding	1.50@ 1.75
Molding coarse	1.50

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Asheville, N. C.—Crude talc	4.50
Ground talc (20-50 mesh), bags	6.50
Ground talc (150-200 mesh), bags	8.50
Baltimore, Md.—Crude talc (mine run)	3.00
Ground talc (20-50 mesh), bags	10.00
Ground talc (150-200 mesh), bags	12.00
Cubes	50.00
Blanks (per lb.)	.07
Chatsworth, Ga.—Grinding	7.00
Ground talc (150-200 mesh); bags	15.00
Pencils and steel workers' crayons (gross)	1.50@ 2.50
Chester, Vt.—Crude talc	4.50
Ground talc (150-200 mesh), bulk	5.50@ 8.50
Emeryville, N. Y.—325 mesh (double air floated), bags	14.75
Glendale, Calif.—Ground talc (150-200 mesh)	16.00@30.00
(Bags extra)	
Ground talc (50-300 mesh)	13.50@15.50
200 mesh	13.50@14.50
Hailesboro, N. Y.—Ground talc (150-250 mesh), bags	18.00
Henry, Va.—Crude talc (lump mine run) per 2000-lb. ton	2.75@ 3.50
Ground talc (20-50 mesh), bags	8.75@10.00
(150-200 mesh), bags	9.75@12.50
Los Angeles, Calif.—Crude talc f.o.b. Silver Lake	7.00@12.00
Ground talc (150-200 mesh), 100-200 lb. bags)	12.00@14.00
Mertztown, Pa.—Ground talc (20-50 mesh); bulk, 5.00; bags	6.00
(150-200 mesh); bulk, 7.00; bags	8.00
Natural Bridge, N. Y.—Ground talc (150-200 mesh) bags	12.00@13.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk	8.50@10.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@22.00
(Bags extra)	
Vermont—Ground talc (20-50 mesh); bags	7.50@10.00
Ground talc (150-200 mesh); bags	8.50@15.00
Waterbury, Vt.—Ground talc (20-50 mesh), bulk	5.00
(Bags 1.00 extra)	
Ground talc (150-200 mesh), bulk	8.00@14.00
(Bags 1.00 extra)	
Pencils and steel workers' crayons, per gross	1.20@ 2.00

Rock Phosphate

(Raw Rock)

Per 2240-lb. Ton

Centerville, Tenn.—B.P.L. 65%	6.00@ 8.50
B.P.L. 65%	6.00
Gordonsburg, Tenn.—B.P.L. 68-72%	4.50@ 5.00
Tennessee—F.o.b. mines, long tons, unground Tennessee brown rock, 72% B.P.L.	7.00
Mt. Pleasant, Tenn.—Analysis, .65-70% B.P.L. (2000 lb.)	6.50
Paris, Idaho.—2000 lb. mine run, B.P.L. 70%	3.50

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Gray Roofing Slate, f. o. b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$10.20	$8.40	$8.10	$7.50
24x14	10.20	8.40	8.10	7.50
22x12	10.80	8.70	8.40	7.80
22x11	10.80	8.70	8.40	7.80
20x12	12.60	9.00	8.70	8.10
20x10	12.60	9.00	8.70	8.10
18x10	12.60	9.00	8.70	8.10
18x 9	12.60	9.00	8.70	8.10
16x10	12.60	8.70	8.40	7.80
16x 9	12.60	8.70	8.40	7.80
16x 8	12.60	8.70	8.40	7.80
18x12	12.60	9.00	8.70	8.10
16x12	12.60	8.70	8.40	7.80
14x10	11.10	8.40	8.10	7.50
14x 8	11.10	8.40	8.10	7.50
14x 7 to 12x6	9.30	8.10	7.50	7.50
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$8.10	$7.20	$5.75
22x11	8.40	8.40	7.50	5.75
Other sizes	8.70	8.70	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

(Continued from preceding page)

(Ground Rock)

Wales, Tenn.—B.P.L. 70% Per 2000-lb. ton	7.75
Barton, Fla.—Analysis, 50-65% B.P.L.	3.50@ 8.00
Centerville, Tenn.—B.P.L., 60-65%	6.50
B.P.L. 75% (brown rock)	12.00
Columbia, Tenn.—B.P.L. 68-72%	5.50
B.P.L. 65% (90% thru 200 mesh) bulk	5.50
Montpelier, Idaho. — Analysis, 72% B.P.L., crushed and dried	3.75
Mt. Pleasant, Tenn.—B.P.L. 65%	5.50
Twomey, Tenn.—B.P.L. 65%	6.50

Florida Soft Phosphate

(Raw Land Pebble)

	Per Ton
Florida—F. o. b. mines, long ton, 68/66% B.P.L.	3.00
68% (min.)	3.25
70% (min.)	3.50
Jacksonville (Fla.) District	10.00@12.00

(Ground Land Pebble)

	Per Ton
Jacksonville, Fla., District	14.00
Add 2.50 for sacks.	
Morristown, Fla.—26% phos. acid	16.00
Mt. Pleasant, Tenn.—65-70% B.P.L.	5.00@ 6.00

Fluorspar

Fluorspar—80% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	20.00
Fluorspar—85% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	21.50

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries		17.50
Deerfield, Md. — Green; bulk	7.00	7.00
Easton, Pa.—Evergreen, creme green and royal green marble	14.00@16.00	16.00@18.00
Slate granules		7.00
Granville, N. Y.—Red slate granules		7.50
Harrisonburg, Va.—Blk. marble (crushed, in bags)		12.50
Ingomar, Ohio (in bags)		10.00@25.00
Milwaukee, Wis.		16.00@35.00
New York, N. Y.—Red and yellow Verona		32.00
Middlebrook, Mo.—Red		25.00@30.00
Phillipsb'g, N. J.—Green stucco dash	14.00@16.00	
Poultney, Vt.—Slate granules		7.50
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Tuckahoe, N. Y.		8.00@12.00
Whitestone, Ga.—White marble chips, net ton in bulk, f.o.b., bags 12½c extra	4.50	4.50

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	20.00	25.00@35.00
Carpenterville, N. J.	16.00	31.50@40.00
Easton, Pa.	16.00	40.00@60.00
Ensley, Ala.	13.30	21.75
Eugene, Ore.	25.00@26.00	50.00@75.00
Friesland, Wis.	22.00	32.00
Houston, Tex.		19.50
Omaha, Neb.	16.00	30.00@40.00
Portland, Ore. (Del'd)	21.00	45.00@75.00
Puyallup, Wash.	18.00	40.00@75.00
Rapid City, S. D.	18.00	25.00@40.00
St. Paul, Minn.	15.00	30.00@37.50
Salem, Ore.	25.00	35.00@50.00
Salt Lake City, Utah	17.00@18.00	35.00@40.00
Springfield, Ill.	18.00	20.00@25.00
Wauwatosa, Wis.	13.00@14.00	25.00@65.00
Watertown, N. Y.	18.00@20.00	32.00@35.00
Winnipeg, Can.	18.00	26.00

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	11.00
Boston, Mass.	15.00@16.50
Buffalo, N. Y.	16.50
Dayton, Ohio	12.50@13.50
El Paso, Texas	14.00
Grand Rapids, Mich.	12.00
Lancaster, N. Y.	14.00
Michigan City, Ind.	11.00
Milwaukee, Wis. (delivered)	14.00
Minneapolis, Minn.	13.00
Plant City, Fla.	10.00
Portage, Wis.	15.00
Redfield, Mass.	15.00
Rives Junction, Mich.	12.00
Saginaw, Mich.	12.00
San Antonio, Texas—Common	15.00
South Dayton, Ohio	12.50@13.50
Syracuse, N. Y. (delivered at job)	17.00
F. o. b. cars	15.00
Washington, D. C.	14.50

Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton	
	Finishing	Common
Atlanta, Ga.	23.00	20.00
Baltimore, Md.	22.00	16.25
Cincinnati, Ohio	15.80	13.30
Chicago, Ill.	18.00	18.00
Dallas, Tex.	22.50	.....
Denver, Colo.	24.00	.....
Detroit, Mich.	19.50	17.50
Kansas City, Mo.	25.60	24.00
Minneapolis, Minn. (white)	25.50	21.00
Montreal, Que.	21.00	21.00
New Orleans, La.	.....	17.25
New York, N. Y.	16.80	13.10
Philadelphia, Pa.	15.50	14.50
St. Louis, Mo.	21.40	19.20
San Francisco, Calif.	22.00	16.00
Seattle, Wash. (paper sacks)	24.00	.....

	Lump per 180-lb. Barrel (net)	
	Finishing	Common
Atlanta, Ga.	2.25†	1.85†
Cincinnati, Ohio	.....	10.75‡
Chicago, Ill.	1.50†	1.40†
Dallas, Tex.	.....	2.50†
Denver, Colo.	.....	2.70†
Detroit, Mich.	.....	18.25‡
Kansas City, Mo.	2.40†	2.40†
Minneapolis, Minn.	1.55†	1.40†
Montreal	15.00‡	11.00‡
New Orleans, La.	2.40†	.....
New York, N. Y.	3.75*	3.00@3.25*
Philadelphia, Pa.	13.00‡	12.00‡
St. Louis, Mo.	17.75	17.75‡
San Francisco, Calif.	.....	1.75†
Seattle, Wash.	2.80†	.....

*Per 280 lb. bbl. (net). †Per 180-lb. bbl. (net). ‡Per ton. Refund of 10c per bbl. Minneapolis quotes brown common lump lime: Kelly Island white is $1.55, Sheboygan, $1.45. New York quotes hydrated lime "on cars" in paper sacks; lump lime "alongside dealers' docks" or "on cars."

Portland Cement

Current prices per barrel in carload lots f. o. b. cars, without bags.

Atlanta, Ga.	2.80
Boston, Mass.	2.68
Cedar Rapids, Iowa	2.48
Cincinnati, Ohio	2.54
Cleveland, Ohio	2.46
Chicago, Ill.	2.20
Dallas, Tex.	†2.85
Davenport, Iowa	2.43
Denver, Colo.	2.65
Detroit, Mich.	2.47
Duluth, Minn.	2.14
Indianapolis, Ind.	2.41
Kansas City, Mo.	2.45
Los Angeles, Calif. (less 5c discount)	3.16
Milwaukee, Wis.	2.37
Minneapolis, Minn.	2.39
Montreal, Can. (sacks 20c extra)	2.40
New Orleans, La.	2.83
New York, N. Y.	2.30
Phoenix, Ariz.	3.70
Pittsburgh, Pa.	2.24
Portland, Ore.	3.05
San Francisco, Calif.	3.03@3.15**
St. Louis, Mo.	2.35
St. Paul, Minn.	2.39
Seattle, Wash.	2.90
Toledo, Ohio	2.48

NOTE—Add 40c per bbl. for bags.
**+warehouse.
†15c ea. sack allowance.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco* Calcined Gypsum	Cement‡ and Gauging Plaster	Wood Fiber	White§ Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	—Plaster Board— ¼x32x36" Weight 1500 lb. Per M Sq. Ft.	⅜x32x36" Weight 1850 lb. Per M Sq. Ft.	Wallboard. ⅜x32 or 48" Lengths 6'-10', 1850 lb. Per M Sq. Ft.
Douglas, Ariz.	.....	6.00	6.00	.....	13.00	.....	.....	.....	.....	.....	.....	.....	.....
Fort Dodge, Iowa	3.00	3.50	6.00	8.00	10.00	10.50	20.00	.....	21.30	20.00	20.00	.....	30.00
Garbutt, N. Y.	.....	.....	6.00	8.00	10.00	10.00	.....	7.00	.....	.....	.....	20.00	.....
Grand Rapids, Mich.	3.00	.....	5.00	10.00	10.00	10.00	.....	.....	31.00	.....	19.75	20.00	30.00
Hanover, Mont.	4.50	.....	6.00	10.00	.....	10.50	.....	.....	.....	.....	.....	.....	.....
Mound House, Nev.	.....	8.50	6.50	10.50@11.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oakfield, N. Y.	3.00	4.00	6.00	8.00	10.00	10.00	20.20	7.00+	30.75	21.00	19.375	20.00	30.00
Rapid City, S. D.	4.00	.....	.....	10.00	11.00	11.50	.....	.....	33.75	.....	.....	.....	.....
San Francisco, Calif.	.....	.....	.....	16.40	.....	.....	.....	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.50	5.50	7.00	13.50	15.00	15.00	.....	.....	.....	.....	28.50	.....	35.00

NOTE—Returnable Jute Bags, 15c each, $3.00 per ton; Paper Bags, $1.00 per ton extra.
*Shipment in bulk 25c per ton less; ‡Bond plaster $1.50 per ton additional; +Sanded Wood Fiber $2.50 per ton additional; §White Moulding 50c per ton additional; †Bulk; (a) Includes sacks.

News of All the Industry

Incorporations

The Southern Sand and Gravel Co., St. Louis, Mo., has been incorporated for $100,000.

The Farris Bros. & Hart Stone Co., Los Angeles, Calif., has been incorporated for $50,000.

The Builders Material Co. has been incorporated in Kelso, Wash., for $10,000.

The Pontiac Cement Products Co., Pontiac, Mich., has been incorporated for $50,000.

The Halifax Rock Co., Daytona, Fla., has been incorporated for $100,000 by J. D. C. Morris and I. D. Morris.

The New London Sand and Gravel Co., Willmar, Minn., has been incorporated for $80,000 by H. L. Wadell and others.

The George E. Bond Granite Co., Inc., Barre, Vt., has been incorporated for $25,000 by L. Pilini, G. Pilini and E. Pilini.

The Clayton Quarry Co., St. Louis, Mo., has been incorporated for $2000 by W. S. Dawley, W. H. Smith and J. G. McKelvey.

The River Road Sand and Gravel Co., Inc., Camden, Mass., has been incorporated for $125,000 to deal in sand, gravel, etc.

The Willmette Gravel Co., Portland, Ore., has been incorporated for $25,000 by E. Wood, G. F. Krause and M. M. Mathiesen.

The Sound Sand and Gravel Co., Seattle, Wash., has been incorporated for $50,000 by W. R. Chesley, A. S. Kerry and J. W. Kerry.

The North Trunk Sand and Gravel Co., Seattle, Wash., has been incorporated for $10,000 by J. C. McKnight, J. R. Binyon and P. M. Binyon.

The Fairmont Sand and Gravel Co., Fairmont, W. Va., has been incorporated for $50,000 by D. D. Simon, M. Simon, S. C. Board, D. W. Carpenter and S. B. Miller.

The Suiter Material and Transport Co., Manchester, Ohio, has been incorporated for $50,000 and is operating plants at Manchester Islands and elevators at Irwin, Ky.

The Foundry Sand and Supply Co., Cleveland, Ohio, has been incorporated for $25,000 by H. B. McGraw, H. J. Piehl, A. D. Bender, T. H. Bushnell and B. K. Piehl.

The John W. Bowser Construction Co., Ltd., Toronto, has been incorporated for $40,000 as contractors, dealers in cement, stone, sand and gravel and quarry operators.

The Brocklebank Co., Inc., Chelsea, Vt., has been incorporated for $50,000 by H. N. Mattison, M. A. Little, S. H. Silson, Chelsea; H. Lyman, Trunbridge, and P. Teefey, Washington.

The Knoxville P. and M. Mortar Co., Knoxville, Tenn., has been incorporated for $750,000 to manufacture motar, lime, cement, plaster, stucco, fireclay, etc. W. B. Townsend is president.

The Bingham Association, Inc., Portland, Me., has been incorporated for $200,000 to engage in general mining, quarrying, smelting, etc. H. S. Bridgman, president; H. P. Sweetser, treasurer.

The H. P. Smith Co., Inc., Boston, Mass., has been incorporated for $50,000 by H. P. Smith, H. E. Smith, Malden; H. C. Smalley, J. L. Le Clair, Quincy; T. M. Howard, Boston; E. A. Smith, Somerville.

The Lime By-Products Corp., Charleston, W. Va., has been incorporated for $500,000 to manufacture lime and cement. Incorporators: J. S. Horan, M. F. Matheny, G. L. Hartley, B. J. Pettigrew and H. Greene.

Cement

The Standard Portland Cement Co.'s plant at Napa Junction, Calif., is being dismantled.

The Lehigh Portland Cement Co., New Castle, Pa., announces a 10 per cent increase of wages for its 800 men. This increase is local and not general.

The Riverside Portland Cement Co., Los Angeles, Calif., is planning to erect a mill near Pheonix, Ariz., to cost $1,000,000. Loren Barton is assistant general manager.

Yankton, S. D.—Detailed plans and specifications for four structures at the state cement plant at Rapid City have been studied and approved by the state cement commission. Bids will be advertised in Huron on April 25.

The Superior Portland Cement Co., Seattle, Wash., operating at Concrete, has purchased 60 flat cars of 80,000 lb. capacity. The cars will be operated from Concrete throughout the Puget Sound country.

The Three Forks Portland Cement Co., Denver, Colo., under authority of Secretary of Interior Reclamation Service, has been awarded a contract for 18,760 bbl. of cement for use on the Flathead irrigation project, Montana. The contract involves about $49,714.

Sand and Gravel

The Springfield-Pekin Sand and Gravel Co., Pekin, Ill., is expending $150,000 on a new gravel pit.

The Hunter Valley Stone Co., Bloomington, Ind., has increased its capital from $60,000 to $150,000.

The Golden Gravel Co., Golden, Miss., will install power equipment, washing and screening equipment, etc., at its new plant to cost $100,000. W. G. Sessions is general manager.

The Bagnell Gravel Co., Tuscumbia, Mo., is building an engine room over the boiler and large drums to control the hoisting cable. Four engines have been placed upon the concrete base.

The Consumers Sand Co., Allis., and the Central Sand Co., Central City, Neb., both operated by Trenmore Cone, Waterloo, Neb., have been consolidated and will operate as the Consumers Sand Co.

The Consumers Rock and Gravel Co., Los Angeles, Calif., plans rebuilding a portion of its plant recently destroyed by fire. New rock crushing machinery, transmission equipment and motors will be installed.

Manufacturers

The Bucyrus Co., South Milwaukee, Wis., announces the removal of its Chicago office on May 1 from 622 McCormick building to new quarters on the corner of Adams and La Salle streets, Room 1015, Corn Exchange Bank building, 134 South La Salle street.

The Victor Balata and Textile Belting Co., New York City, owing to increased business, has been forced to move its former Chicago office and warehouse. After May 1 it will be located at 345-359 West Austin avenue. The new location gives improved shipping facilities, increased space and other advantages which will enable it to make immediate shipments.

Trade Literature

Conveyors—"For faster, easier, cheaper loading and unloading," the Standard Conveyor Co., North St. Paul, Minn., is distributing a loose-leaf catalog to the trade describing its machines for handling all kinds of loose material—cars, wagons, trucks, reclaiming, transferring piles, delivering to bins and boiler rooms and other similar work. The conveyor may be used singly or in series, one machine delivering by a chute to another until any height is piled or any distance conveyed.

"Profitable Night Work" is a folder distributed by the Alexander Milburn Co., 1416 West Baltimore street, Baltimore, illustrating how costs can be cut and results improved by use of its portable light in quarrying, construction work and other service. Accompanying the folder is a booklet on the Milburn welding and cutting apparatus. This booklet shows illustrated examples of acetylene generators for industrial plants, compressing plants for shops, carrying outfits, garage repair outfits and the like.

Locomotive Cranes.—A catalog has recently been issued by the Ohio Locomotive Crane Co., Bucyrus, Ohio, containing 72 illustrated pages telling the story of its product, together with a blueprint plate showing the details of its eight-wheel, 20-ton crane. It also describes its facilities for the manufacture of a wide variety of types varying from 10 to 50 tons capacity operated by steam, electricity, compressed air or oil engines.

"Electric Hoists and Overhead Cranes."—The Link-Belt Co., Chicago and Philadelphia, has recently issued a comprehensive and instructive book on this subject. It is not only profusely illustrated with actual installations showing some of that company's recent electric hoist applications, but with line and wash drawings the subject of proper installations and efficient operation is fully covered. This book goes further than the usual "catalog," as it tells in print and picture of the practices and methods employed by users in widely divergent fields.

Statement of Ownership of Rock Products

Statement of the ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, of ROCK PRODUCTS, published every other week at 542 S. Dearborn St., Chicago, Ill., for April 1, 1923. State of Illinois, County of Cook. ss.

Before me, a Notary Public in and for the state and county aforesaid, personally appeared George P. Miller, who, having been duly sworn according to law, deposes and says that he is the manager of ROCK PRODUCTS, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Tradepress Publishing Corp.; Editor, Nathan C. Rockwood; Managing Editor, Nathan C. Rockwood; Business Manager, George P. Miller; all at 542 S. Dearborn St., Chicago, Ill.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.): Tradepress Publishing Corp., W. D. Callender, T. J. Sullivan, George P. Miller, N. C. Rockwood, W. B. Mayor, D. R. Hicks, H. P. Sessions, A. H. McQuilkin, and C. O. Nelson, all at 542 S. Dearborn St., Chicago, Ill.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are (if there are none, so state): There are none.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest, direct or indirect, in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is (this information is required from daily publications only).

GEO. P. MILLER,
(Signature of Business Manager)

Sworn to and subscribed before me this 4th day of April, 1923.

(SEAL) Charles O. Nelson.

(My commission expires April 6, 1926.)
Form 3526—Ed. 1916.

STURTEVANT

MOTO-VIBRO SCREEN
ABOUT 1/2 THE PRICE OF OTHERS

And With No Sacrifice to Quality, Accessibility, Accuracy or Capacity

In fact, it is a superior screen in every respect.

Its vibration is better than the best of others, because it is evenly distributed and uniform in its

STINGING INTENSITY

yet noiseless, non-destructive and does not require dangerous wire stretching or disastrous flexing. All auxiliaries, motor-generators, complications, delicate adjustments, and obstructions on Screens are eliminated.

It is truly a simple Screen of Unit construction, one, two or three Screens per Unit, all accessible through a light, strong "open door." Simple, easily covered frames of convenient size, all interchangeable, scalper in cover, none fastened and all readily removed.

Screens anything screenable, coarse or fine.

SOLD ON TRIAL

STURTEVANT MILL CO. HARRISON SQUARE **Boston, Mass.**

New Machinery and Equipment

An Advance in Pump Valves

"USERS and prospective users of pumps will be interested to know that some valuable improvements in pump valve construction have been made," says the Worthington Pump and Machinery Corp., of New York. "An entirely different form of valve has been perfected which, when applied to service conditions that have been difficult for the older standard valves by causing them to cut and to leak, will eliminate both. It increases the average pump efficiency; decreases the cost of pumping, and continually maintains the pump capacity at its maximum point. The only way to prevent leakage with ordinary valves is to remove and replace them with new valves."

To overcome rapid and costly wearing, cutting and cracking action, the Worthington engineers have evolved the new and novel type of valve shown in Fig. 2, known as the Worthington "Seal" valve for use when conditions are too hard for the ordinary valves.

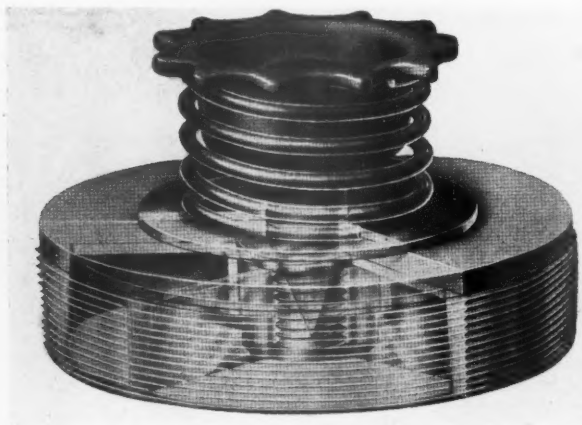
This new "Seal" valve, it is claimed, assures absolute tightness when closed because the rubber is "flexible" and will always seat perfectly both at the hub and outer rim, its inner and outer seats, and so keep tight. Age and continuous usage do not cut grooves or cause cracks. A flexible rubber seal used for one year in this new type of valve showed no visible wear or leakage; therefore renewal was unnecessary and there was no repair cost.

There are no screws, bolts, rubber rings, nuts, bushings or rotating elements. The special new feature is the so-called "bottom plate." This is in effect a middle seat for the rubber valve proper. When the valve is closed this middle seat carries the entire load and prevents the rubber seal from cutting on the seats or ribs. This bottom plate moves up and down with the rubber, and so not only acts as a middle seat, but this middle seat is movable with the rubber and helps to keep the rubber valve in shape even when open. Thus all mechanical functions requiring strength and wear resistance are cared for by metal parts. The flexible rubber acts only as a seal against leakage. It will be noticed that even the top of the rubber seal is protected by a thin "backing plate" which keeps the rubber seal flat and prevents any possibility of wear from contact with the spring.

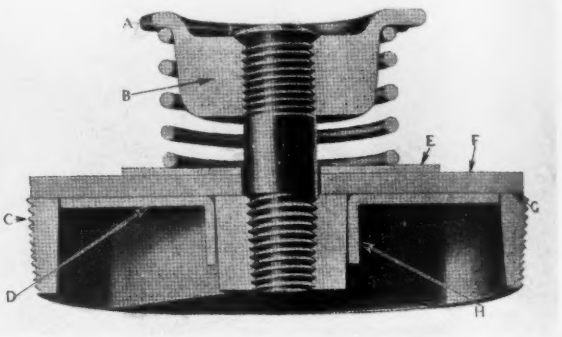
All moving parts are light but amply rigid. The lightness assures a smooth, quiet-running pump; the rigidity prevents the distortion that results in leakage, it is claimed.

It is not anticipated that repairs or replacements will be often required, but the construction makes this easy when it does become necessary, and the cost of any possible repairs will be low because of the simplicity and inexpensiveness of all parts.

This valve is especially suitable for severe and unusual conditions and is available even for ordinary pumping conditions.



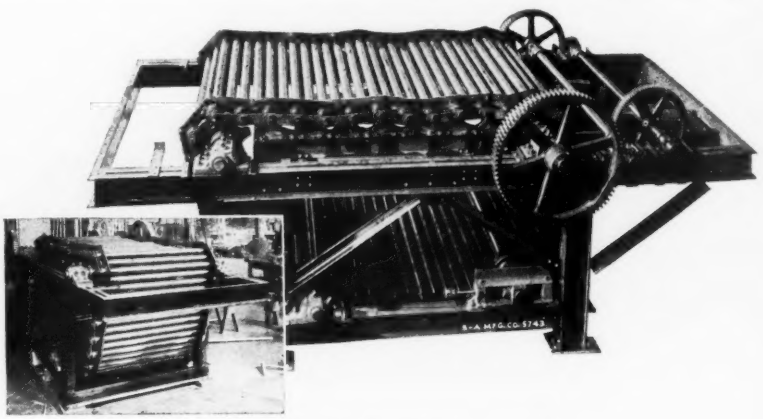
Phantom view of seal valve



The seal valve shown in section

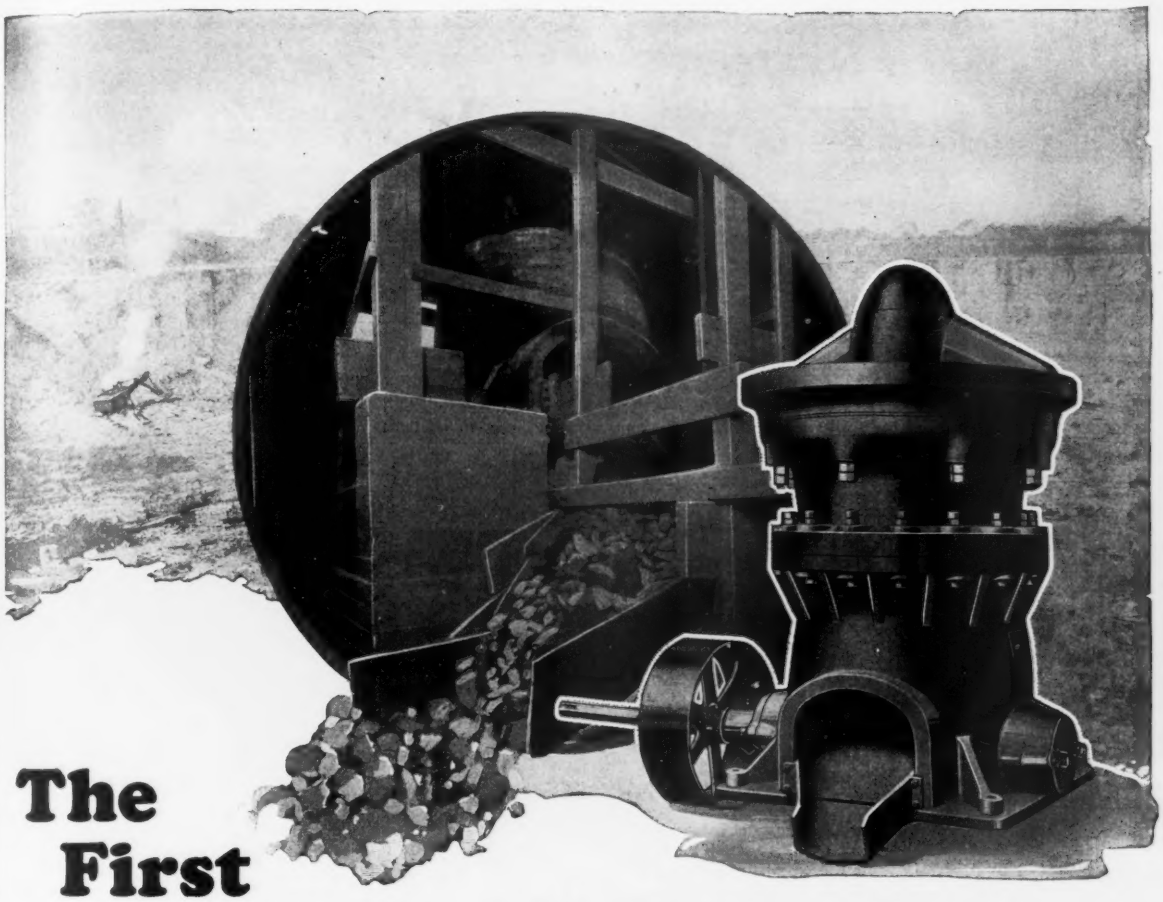
A New Grizzly Feeder

THIS new grizzly feeder, says its makers, the Stephens-Adamson Mfg. Co., Aurora, Ill., finds favor where it is desirable to clear crusher materials from fine and undersized matter.



Grizzly feeder, broncho type track

The irregular track causes constant agitation or "bucking" of the aggregate material, with the result that the fines drop through the bars very readily. Only oversize material is introduced into the crusher. The agitation of the material aids separation.



The First Superior McCully Crusher Bought in 1909

. . . and the success of the first sold three more

The Elmhurst Chicago Stone Company bought the first short shaft gyratory made by Worthington at the Power & Mining Works. This was in 1909. In 1912 they installed a duplicate. In 1914 another Superior McCully went into the same plant and in 1922 they installed the fourth Worthington gyratory. Every one of these crushers, excepting the first, was bought purely and solely on the basis of past performance, the way that you can buy crushers, too—if you get Worthington gyratories.

WORTHINGTON PUMP AND MACHINERY CORPORATION

Executive Offices: 115 Broadway, New York City. Branch Offices in 24 Large Cities W-207.8

WORTHINGTON

Deane Works, *Holyoke, Mass.*
Blake & Knowles Works *East Cambridge, Mass.*
Worthington Works *Harrison, N. J.*
Laidlaw Works, *Cincinnati, Ohio.*
Hazleton Works, *Hazleton, Pa.*
Gas Engine Works, *Cudahy, Wis.*
Power & Mining Works *Cudahy, Wis.*
Snow-Holly Works *Buffalo, N. Y.*
Epping-Carpenter, *Pittsburgh, Pa.*

Buyers' Directory
of the Rock Products Industry

Classified Directory of Advertisers in this issue of Rock Products

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Interstate Equip. Co., New York, N. Y.

AIR COMPRESSORS
Worthington Pump & Mach. Corp., New York City, N. N.

AUTOMATIC WEIGHERS
Richardson Scale Co., Passaic, N. J.
Schaffer Eng. & Equipment Co., Pittsburgh, Pa.

BAGS AND BAG MACHINERY
Jaite Co., The, Jaite, Ohio

BELTING
Robins Conveying Belt Co., New York City, N. Y.

BINS
Austin Mfg. Co., Chicago, Ill.
Brown Hoisting Machinery Co., Cleveland, Ohio.
Link-Belt Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill. (storage).

BELT FASTENERS
Crescent Belt Fastener Co., New York City, N. Y.

BIN GATES
Allis-Calmers Mfg. Co., Milwaukee, Wis.
Austin Mfg. Co., Chicago, Ill.
Brown Hoisting Machinery Co., Cleveland, Ohio.
Link-Belt Co., Chicago, Ill.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

BRICK MACHINERY
Shope Brick Co., Portland, Ore.
Besser Sales Co., Chicago, Ill.
Wert Mfg. Co., Chicago, Ill.

BUCKETS—Elevator
Austin Mfg. Co., Chicago, Ill.
Brown Hoisting Machinery Co., Cleveland, Ohio.
Hendrick Mfg. Co., Carbondale, Pa.
Link-Belt Co., Chicago, Ill.
Orton & Steinbrenner, Chicago, Ill.
Webster Mfg. Co., Chicago, Ill.

BUCKETS, GRAB
Brown Hoisting Machinery Co., Cleveland, Ohio.
McMyler Interstate Co., Cleveland, Ohio.

CABLEWAYS
Interstate Equip Co., New York, N. Y.
Link-Belt Co., Chicago, Ill.

CALCINING MACHINERY
Atlas Car & Mfg. Co., Cleveland, Ohio.
Butterworth & Lowe, Grand Rapids, Mich.

CARS—Quarry and Industrial
Atlas Car & Mfg. Co., Cleveland, Ohio.

CAR PULLERS
Link-Belt Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

CEMENT MACHINERY
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Kennedy-Van Saun Mfg. & Eng. Corp., New York City.

CHAIN
Carroll Chain Co., Columbus, Ohio.
Morse Chain Co., Ithaca, N. Y.

CLUTCHES
Dodge Mfg. Co., Mishawaka, Ind.
Link-Belt Co., Chicago, Ill.
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

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Kennedy-Van Saun Mfg. & Eng. Corp., New York City.
Link-Belt Co., Chicago, Ill.
Smith Eng. Works, Milwaukee, Wis.
Robins Conveying Belt Co., New York City.
Sturtevant Mill Co., Boston, Mass.
Universal Road Mach. Co., Kingston, N. Y.
Webster Mfg. Co., Chicago, Ill.

CRANES—Crawler
Industrial Works, Bay City, Mich.

CRANES—Locomotive
Byers Machine Co., Ravenna, Ohio.
Erie Steam Shovel Co., Erie, Pa.
Industrial Works, Bay City, Mich.
Koehring Co., Milwaukee, Wis.
Link-Belt Co., Chicago, Ill.
McMyler-Interstate Co., Cleveland, Ohio.
Ohio Locomotive Crane Co., Bucyrus, Ohio.
Orton & Steinbrenner, Chicago, Ill.
Osgood Co., The, Marion, Ohio.
Northwest Engineering Co., Chicago, Ill.

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Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Pulverizer Co., St. Louis, Mo.
Austin Mfg. Co., Chicago, Ill.
Austin-Western Road Mach. Co., Chicago, Ill.
Buchanan Co., Inc., C. G., New York, N. Y.
Butterworth & Lowe, Grand Rapids, Mich.
Fuller-Lehigh Co., Fullerton, Pa.
Good Roads Machinery Co., Kennett Square, Pa.
K. B. Pulverizer Co., New York, N. Y.
Kennedy-Van Saun Mfg. & Eng. Corp., New York, N. Y.
Kent Mill Co., Brooklyn, N. Y.
Lewistown Fdry. & Mach. Co., Lewistown, Pa.
McLanahan-Stone Mach. Co., Hollidaysburg, Pa.
Morgan Engineering Co., Alliance, Ohio.
Munson Mill Machinery Co., Utica, N. Y.
New Holland Machine Co., New Holland, Pa.
Pennsylvania Crusher Co., Philadelphia, Pa.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Smith Eng. Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Universal Crusher Co., Cedar Rapids, Iowa.
Universal Road Mach. Co., Kingston, N. Y.
Webb City and Carterville Fdy. and Mach. Co., Webb City, Mo.
Williams Pat. Crush. & Pulv. Co., Chicago, Ill.
Worthington Pump & Mach. Corp., New York City, N. N.

CRUSHER REPAIRS—Manganese Steel
American Manganese Steel Co., Chicago Heights, Ill.

DERRICKS
American Hoist & Derrick Co., St. Paul, Minn.

DIPPER TEETH
American Manganese Steel Co., Chicago Heights, Ill.

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Ellicott Machine Co., Baltimore, Md.

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Sanderson Cyclone Drill Co., Orrville Ohio.

DRILLERS
Pennsylvania Drilling Co., Pittsburgh, Pa.

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Lewistown Fdy. and Mach. Co., Lewistown, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.
Weller Mfg. Co., Chicago, Ill.

DUST COLLECTING SYSTEMS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

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Morris Mach. Works, Baldwinsville, N. Y.

ENGINEERS
Buckbee Co., J. C., Chicago, Ill.
Hunt, R. W., & Co., Chicago, Ill.
Richard K. Meade & Co., Baltimore, Md.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Webster Mfg. Co., Chicago, Ill.

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Sauerman Bros., Chicago, Ill.

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Link-Belt Co., Chicago, Ill.

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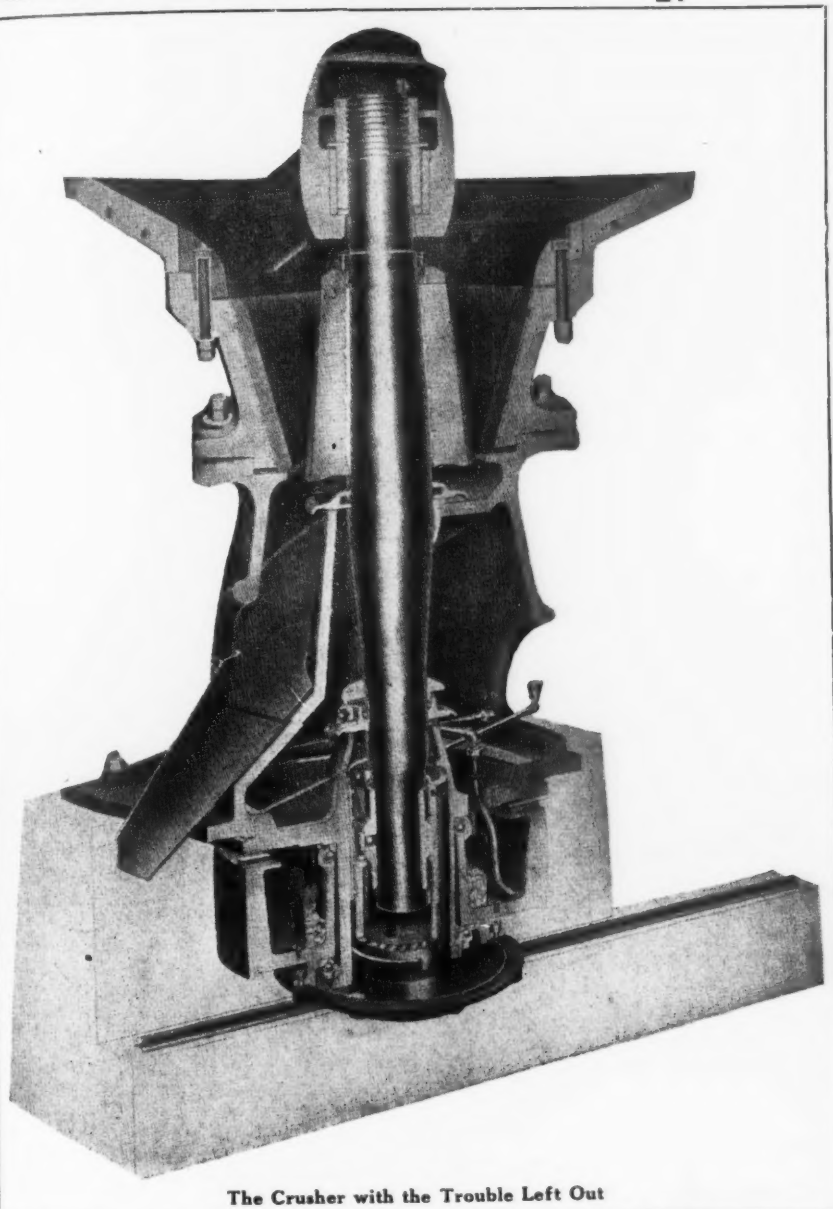
Munson Mill Machinery Co., Utica, N. Y.

KENNEDY *GEARLESS* CRUSHERS

The Kennedy has revolutionized the rock crushing industry. It represents a definite step in advance, and is unquestionably the best, strongest, and most efficient unit known to rock crushing engineering.



The Crusher with the Trouble Left Out

Points of Superiority

1. Less Power Consumption
2. Low Operating Cost
3. Continual Operation —Not Limited to Safe Gear Speed — Strikes a Harder Blow, and Has Increased Capacity
4. Perfected Dust Proof Circulating Oiling System.
5. Can Be Set in Any Position—And Takes Less Room
6. Equipped with Patented Ball and Socket Eccentric.
7. Noiseless.

Parts Eliminated

1. Outboard Bearing
2. Counter Shaft
3. Inner Bearing Cap
4. Base, and Support
5. Thrust Ring
6. Pinion
7. Gear
8. Key for Gear
9. Two Steel Wearing Rings
10. Bronze Wearing Rings.

Parts Added

1. Set Balls
2. Ball Race Rings
3. Ball Retainer.

This improvement has actually reduced cost of maintenance 80%, not including head and concaves.

Write for Catalogue and Information

Kennedy Van Saun Mfg. and Eng. Corp.

50 Church St., New York

Compagnie Des Entreprises Industrielles
40 Rue des Mathurins, PARIS

Harron Rickard & McCone, Inc., San Francisco and Los Angeles

Buyers' Directory

of the Rock Products Industry

Classified Directory of Advertisers in this issue of Rock Products

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Robins Conveying Belt Co., New York City.

HOISTS

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Austin Mfg. Co., Chicago, Ill.
Hyman-Michaels Co., Chicago, Ill.
Link-Belt Co., Chicago, Ill.
Thomas Elevator Co., Chicago, Ill.
Vulcan Iron Works, Wilkes-Barre, Pa.
Weller Mfg. Co., Chicago, Ill.

HYDRATING MACHINERY

Atlas Car & Mfg. Co., Cleveland, Ohio
Kritzer Co., The, Chicago, Ill.
Miscampbell, H., Duluth, Minn.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Toepfer & Sons Co., W., Milwaukee, Wis.

HYDRAULIC DREDGES

Morris Machine Works, Baldwinsville, N. Y.

INSULATION

Celite Products Co., Chicago, Ill.

LIME HANDLING EQUIPMENT

Link-Belt Co., Chicago, Ill.
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

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Vulcan Iron Works, Wilkes-Barre, Pa.
Worthington Pump & Mach. Corp., New York City, N. N.

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Brown Hoisting Machinery Co., Cleveland, Ohio.
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Orton & Steinbrenner, Chicago, Ill.

LOCOMOTIVES

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Ironton Engine Co., Ironton, Ohio.
Lima Locomotive Works, New York, N. Y.
Vulcan Iron Works, Wilkes-Barre, Pa.
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Worthington Pump & Mach. Corp., New York City, N. N.

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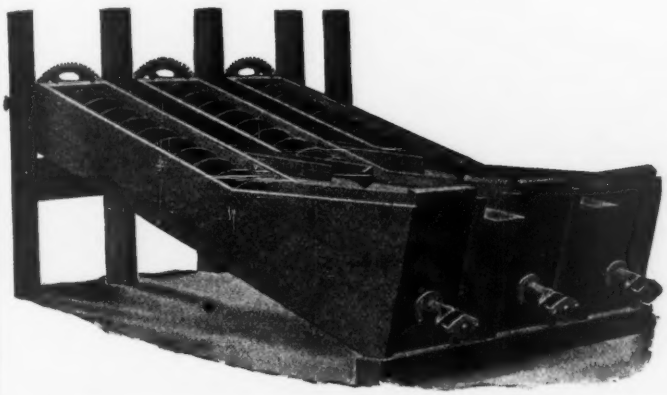
Mr. Sand Man!

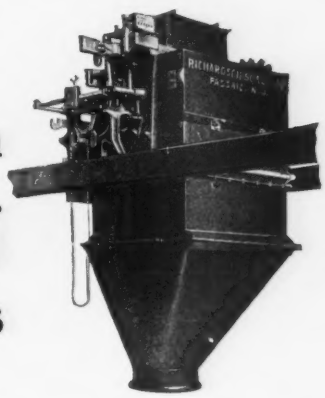
IF it's clean sand you want to produce and you are unable to do so, write to us and state your trouble and we can help you to solve your problem. We make machinery that produces the cleanest Glass Sand.



The Lewistown Equipment, which includes Crushing, Grinding, Screening, Washing, Drying and Conveying Machinery, will produce more and a better quality of Glass Sand, at a bigger profit than any other equipment on the market.

LEWISTOWN FOUNDRY & MACHINE COMPANY
Lewistown, Pa.

Build Bigger Profits by Checking Lime Output Against Fuel Consumption



Use RICHARDSON Automatic Bulk Scales

TO REGISTER YOUR FUEL CONSUMPTION AND LIME OUTPUT

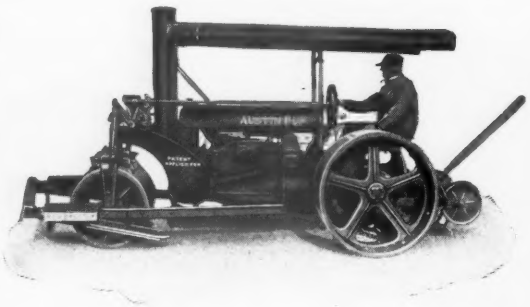
Substitute accurate, dependable weights for guess work. Scales furnish a continuous check on coal fed to boilers and kilns, and register automatically your output of lime.

Production Checked Against Fuel Charges Will Give You the Control You Need

RICHARDSON SCALE COMPANY

Passaic, New Jersey

New York Boston Buffalo Chicago Omaha
Minneapolis Wichita Memphis San Francisco



Announcing the Arrival of the

AUSTIN PUP

Weight 3 Tons

Inspired by the demand for a roller that will

- Level and roll subgrade
- Pull a plow or scraper
- Act as a general purpose roller and tractor

} for contractors

- Scarify, level and roll gravel and earth roads
- Prepare old roads for re-surfacing, and then roll the new material
- Act as an all-around roller and maintainer

} for county, township, village and other public officials

and, best of all

Cost little to buy and to operate, and next to nothing to maintain

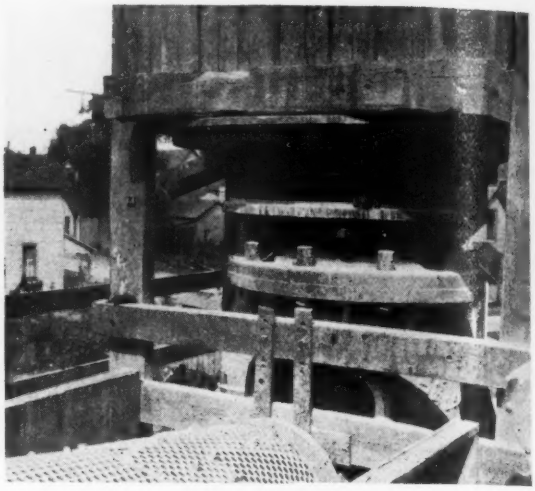
A SPECIAL ANNOUNCEMENT GIVES FULL DETAILS

Act quick if you want one of the first litter

THE AUSTIN-WESTERN ROAD MACHINERY CO.

Factories and Home Office: Chicago

Branches Everywhere



No. 5

AUSTIN Gyratory Crusher

At the Plant of The Continental Clay Company, Columbus, Ohio

This Crusher is used to reduce the gravel chuted to it from the 2 in. screen to 1¼ in. and down. This profitable operation is carried on with a regularity of service that spells the difference between unbroken satisfaction and continuous annoyance.

Austin Gyratory Crushers are famous for this very kind of service. Catalog No. 29 tells the whole story of the construction and operating features that are behind it. We will gladly mail you a copy.

AUSTIN MANUFACTURING CO.

New York Chicago San Francisco

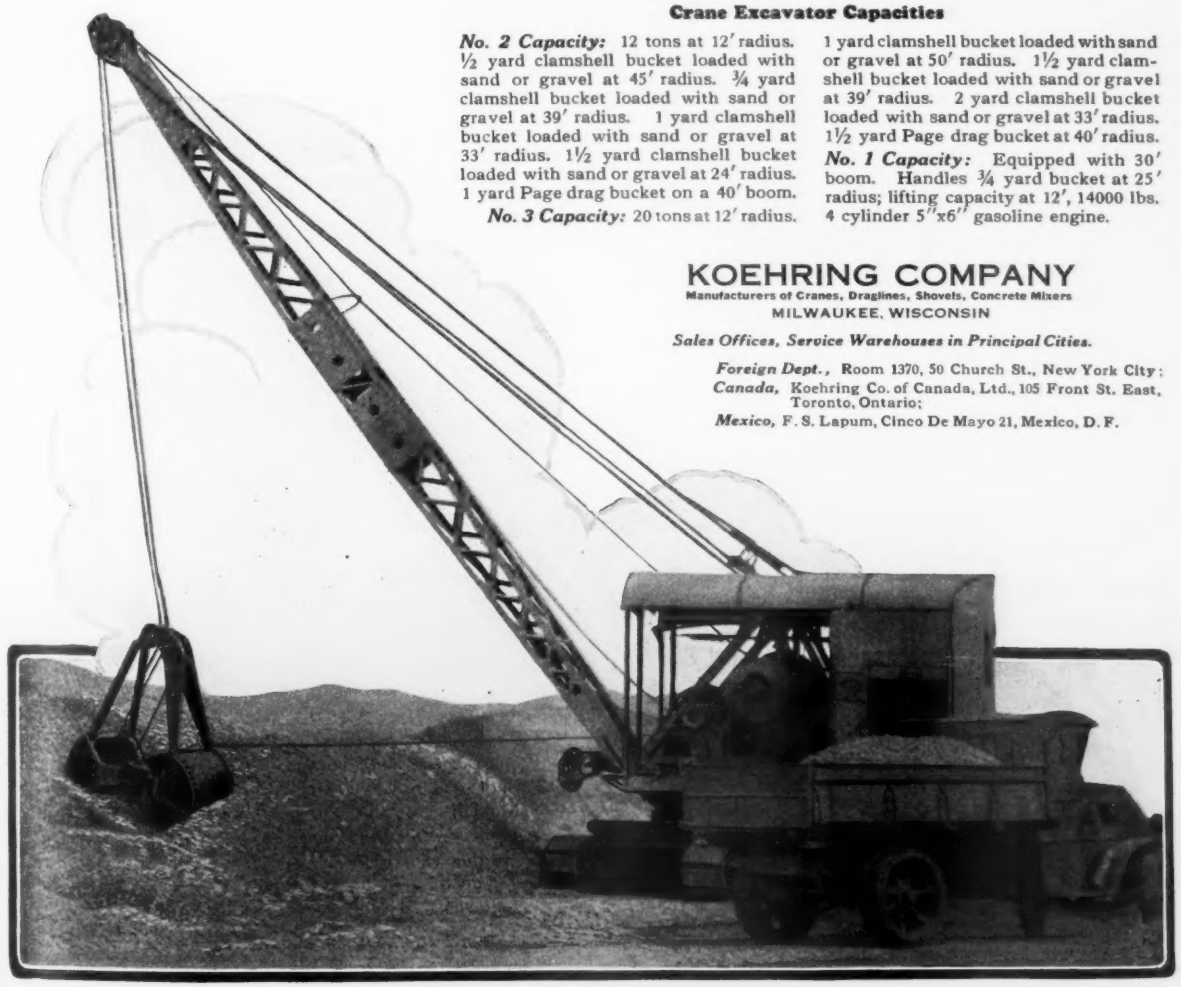
KOEHRING CRANE EXCAVATOR

Again We Say "Boom and Hoist"

COMBINING of these two operations into one simultaneous operation instead of two "stop-and-go" operations means speed in handling materials — a greater ability of the Koehring to work in closer quarters and under a broader range of conditions. "Boom and Hoist" is a distinctive Koehring feature in that the Koehring is *designed* for this combination operation, and inflicts no penalty of excessive wear.

Koehring Heavy Duty construction is a principle of construction which demands extra liberality of strength at every point and oversize construction of every detail. It means lower maintenance, greater trouble-free service life.

Write for Koehring Crane Catalog No. 00



Crane Excavator Capacities

No. 2 Capacity: 12 tons at 12′ radius. ½ yard clamshell bucket loaded with sand or gravel at 45′ radius. ¾ yard clamshell bucket loaded with sand or gravel at 39′ radius. 1 yard clamshell bucket loaded with sand or gravel at 33′ radius. 1½ yard clamshell bucket loaded with sand or gravel at 24′ radius. 1 yard Page drag bucket on a 40′ boom.

No. 3 Capacity: 20 tons at 12′ radius. 1 yard clamshell bucket loaded with sand or gravel at 50′ radius. 1½ yard clamshell bucket loaded with sand or gravel at 39′ radius. 2 yard clamshell bucket loaded with sand or gravel at 33′ radius. 1½ yard Page drag bucket at 40′ radius.

No. 1 Capacity: Equipped with 30′ boom. Handles ¾ yard bucket at 25′ radius; lifting capacity at 12′, 14000 lbs. 4 cylinder 5″x6″ gasoline engine.

KOEHRING COMPANY
Manufacturers of Cranes, Draglines, Shovels, Concrete Mixers
MILWAUKEE, WISCONSIN

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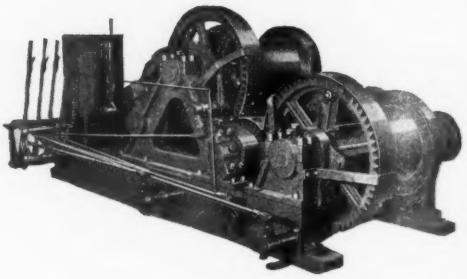
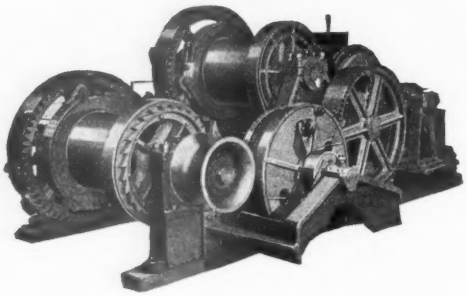
Mexico, F. S. Lapum, Cinco De Mayo 21, Mexico, D. F.

THOMAS HOISTS



Single and Two Speed Types



Designed and built for every requirement of the Sand, Gravel and Stone Producer.

For

Dragline Cableways
Drag Scrapers
Derricks
Bucket Operation
Car Haulage

THOMAS ELEVATOR COMPANY

27 South Hoyne Avenue **Chicago, Ill.**

The above is one of a considerable number of Vulcan locomotives, operated by the Michigan Limestone & Chemical Co., Rogers City, Mich. This firm own two of this particular size and type, of which the general specifications are as follows: Cylinders, 13 in. x 20 in.; Gauge, 4 ft. 8½ in.; Service Weight, 39 tons; Diameter of Drivers, 36 in.; Boiler Pressure, 180 lbs.; Tractive Force, 14,365 lbs. No. 6ET Air Brake with M. C. B. Automatic Couplers.

Vulcan Locomotives

Spread before you in the quarries of all the world is the record of Vulcan popularity.

No one can look at the clean cut and apparent mechanical superiority of a Vulcan Locomotive and question its ability to render extremely efficient service.

No one seeing them scattered over the earth can mistake in what overwhelming regard they are held, and only a machine that gives great and economical service and performs reliably always can deliver such satisfaction.

VULCAN IRON WORKS, Established 1849

1753 Main Street **Wilkes-Barre, Pa.**

"For Traction and Power, The Shay Leads Them All"

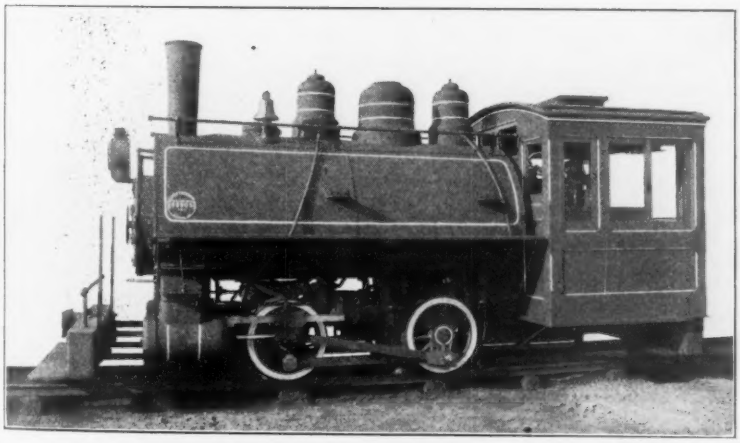
"We recommend the Shay Geared Locomotive very highly for quarry work. It will work on a track that a side rod engine could not move on. Our company are using various types of locomotives at their nine different plants. But for traction and power, the Shays lead them all."

From the Superintendent of a crushed stone company which has six Shays in use at one plant. These Shays have been operating continuously since 1908 and 1911 and, the Superintendent writes, "are in good shape today and doing their work as well as a new machine."

Would you like to know what a Shay will do on your job? Tell us about your hauling problems.

LIMA LOCOMOTIVE WORKS
Incorporated
Lima, Ohio 17 East 42nd St., New York

Baldwin Industrial Locomotives are built to give years of service



Baldwin Four-Coupled Tank Locomotive. Light Design
Gauge, 3 ft. 0 in. Driving wheels, diameter, 29 in.
Cylinders, 10x16 in. Tank capacity, 700 gallons.
Total weight, 37,000 pounds.

FOR pit and quarry work; for companies which supply road-building materials, and for general contracting purposes, the four-coupled tank locomotive illustrated gives universal satisfaction.

Prices and specifications upon request

THE BALDWIN LOCOMOTIVE WORKS
PHILADELPHIA

Missabe Dipper

An Amsco Product

Among the many desirable and exclusive features that help to make this the ideal bucket for the heavy work encountered in quarry service are:

1. **The body proper consists of a front and back casting, securely riveted together, affording a very rugged construction, with the fewest possible parts.**
2. **The bail brackets attached to the front casting, set at the proper angle, throw all the digging strain on the front, which is strong enough to properly sustain it, eliminating the shearing of rivets and the pulling apart of the front and back castings.**
3. **All pin holes, in which severe wear occurs, are fitted with renewable keyed-type bushings of manganese steel, increasing service. There are many other desirable features which are explained in our Missabe Dipper Bulletin. Write for your copy today.**

Clark Reversible Dipper Tooth

A heavy duty two-part tooth constructed to give maximum service under the most severe digging conditions. The design insures rigidity of the tooth and eliminates any possibility of the point becoming loose or dropping off.

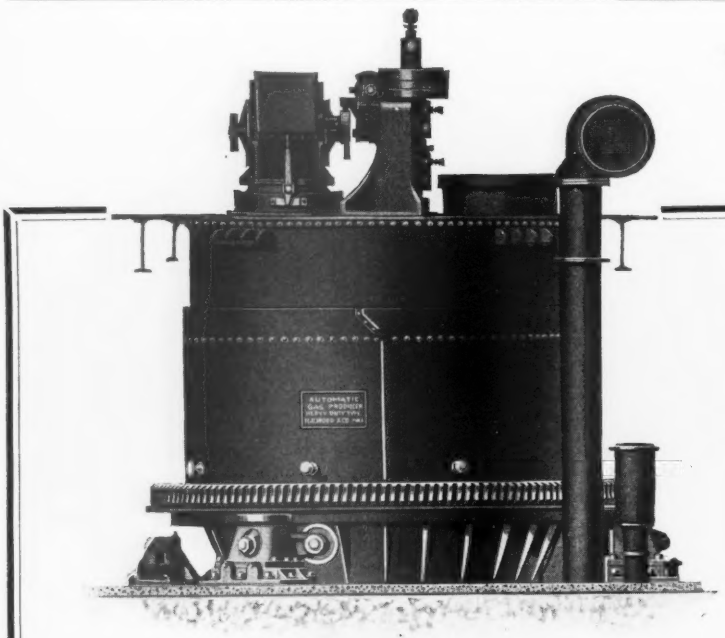
Get our liberal exchange proposition on dipper teeth

AMERICAN MANGANESE STEEL COMPANY

General Sales Office:

398 East 14th Street, Chicago Heights, Illinois

FOUNDRIES: Chicago Heights, Ill.; New Castle, Del., and Oakland, Cal.



Wood Automatic Gas Producers

For a maximum of uniformly rich gas from a minimum of fuel, and for low labor cost and small maintenance expense the R. D. Wood & Company's Automatic Gas Producers can not be equaled.

The Heavy Duty type gasifies up to 50 tons of coal per 24 hours and the M. C. type up to 30 tons.

Used in leading lime plants. Our catalog tells why. Send for it.

HYDRAULIC MACHINERY AND OPERATING VALVES

R. D. WOOD & CO.

CAST IRON PIPE, HYDRANTS AND VALVES

ESTABLISHED 1803

PHILADELPHIA, PA.

Convert Waste Into Profit

The Wert Manufacturing Company manufactures machinery for the production of Concrete Brick, either Common or Facing Brick, with a daily capacity for each unit of from 600 to 30,000. Also will design and furnish estimates, plans of lay-out and complete specifications for erection and equipment of Concrete Products Plants, ready for operation, to convert your waste products into a substantial profit at the best possible advantage.

For information address

The Wert Manufacturing Company

Railway Exchange Building **Chicago, Illinois**

"CARROLL"
SOLID WELD
STEAM SHOVEL CHAIN

Use "Carroll" Solid Weld Chains.

They will give you the service you have a right to expect.

Superior workmanship, insuring satisfaction on the job.

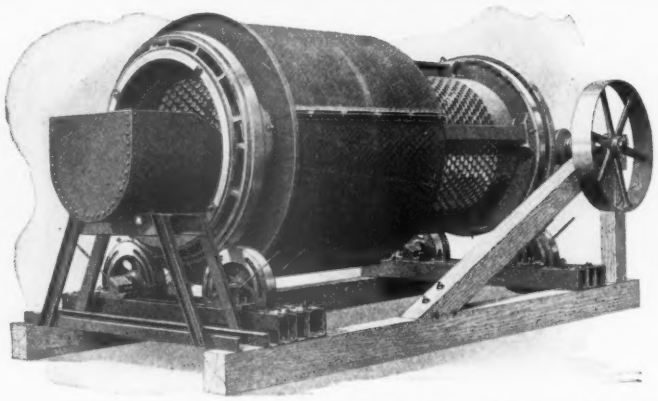
Read what Mr. Willard D. Robison, Vice-President and Treasurer of the Toledo Stone and Glass Sand Company, thinks of the Carroll:

"We purchased a 1¼-in. chain from the Carroll Chain Company of Columbus, Ohio, early last summer, and we have found this chain to be thoroughly satisfactory in every way."

Every user is a booster.

THE CARROLL CHAIN CO.

Columbus, Ohio



Screening Equipment

To meet the requirements of modern rock crushing plant operators, Allis-Chalmers have designed and successfully installed their Style "B" Open End Revolving Screens.

You will find the same rugged construction which characterizes all of Allis-Chalmers products thru a half century of experience. Allis-Chalmers screens will win for you in the long run. A complete line of screens, including the "Allis-Chalmers Compensated Type Shaking Screens."

Let our engineers figure on your requirements
Write for estimates

ALLIS-CHALMERS MANUFACTURING CO.
MILWAUKEE, WIS. U.S.A.

WELLER-MADE EQUIPMENT

For Handling the Materials Mechanically

Increase the Output and Reduce Costs by Employing Weller-Made Machinery to Do the Work

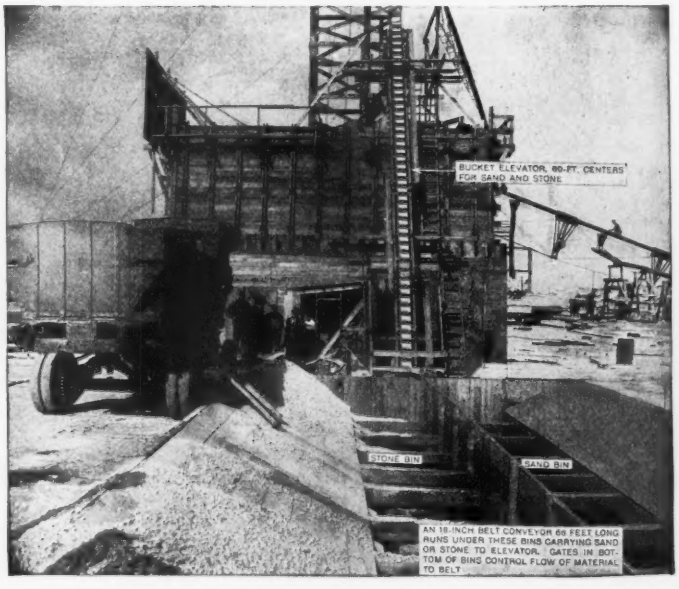
It is sturdy and reliable. Never lays down on the job. The cost of operation is small. Will help pay dividends.

We Make
Conveyors of All Types

Bucket Elevators	Portable Elevators
Steel Storage Bins	Bin Gates
Screens	Sheet Metalwork, etc.

WELLER MADE CHICAGO

Write and let us know the kind of equipment you are interested in or the material you want to handle. Catalogues showing installations, also data to help in selection of equipment, will be sent.


BUCKET ELEVATOR, 60-FT. CENTERS FOR SAND AND STONE
STONE BIN
SAND BIN
AN 18-INCH BELT CONVEYOR 66 FEET LONG RUNS UNDER THESE BINS CARRYING SAND OR STONE TO ELEVATOR. GATES IN BOTTOM OF BINS CONTROL FLOW OF MATERIAL TO BELT

WELLER MFG. CO.

1820-1856 North Kostner Avenue **Chicago, Illinois**

SALES OFFICES

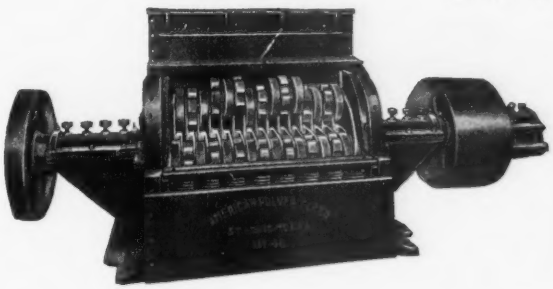
New York Boston Baltimore Pittsburgh Cleveland San Francisco Salt Lake City

American Ring Pulverizer

"We have an American Ring Pulverizer in our plant which has been in service for about 12 years or more, and it has given us the very best of satisfaction with a minimum of repairs. Our crusher has crushed an average of 20,000 tons per year since we installed it."

Winchester Granite Brick Co., Dudley, Ky.
G. N. Wyckoff, Gen. Mgr.

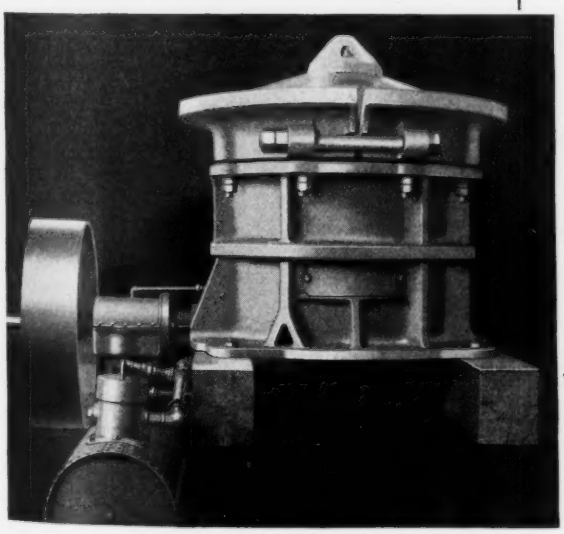
If you have extra hard material, or material mixed with foreign matter, or if you receive too much oversize or immarketable size, we can be of service to you.



There is economy in running a machine equipped with the patent ring, because the flexibility of the rings reduce the motor power. 600 R. P. M. does its most effective work.

American Pulverizer Co., 18th & Austin, St. Louis, Mo.

TELSMITH—
The *CAST STEEL*
Rock Crusher

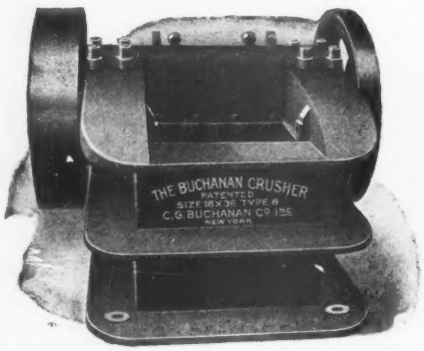


Pioneer again! Telsmith introduced the pillar-shaft crusher—the crusher with the short frame, bolt-shaft and parallel stroke. Telsmith was first with a gear-pump and force-feed oiling system. Telsmith pioneered the pillar-shaft reduction crusher with umbrella-shaped head. Now, Telsmith announces **the first fool-proof gyratory crusher.**

ALL Telsmith Crushers, both coarse and secondary, are now furnished with outer structure of STEEL, not grey iron. Shaft, frame and crown are guaranteed against breakage even by tramp iron, for two years from shipment. All the old Telsmith advantages are retained. The fool-proof steel structure is just another big improvement in a machine that long has been the undisputed leader of the crushing field.

Glad to send you, without obligation, catalog No. 166 (Telsmith Primary Breaker) and bulletin No. 2F11 (Telsmith Reduction Crusher). Write now before you forget.

SMITH ENGINEERING WORKS
3188 Locust Street **Milwaukee, Wisconsin**
Canadian Agent—Canadian Ingersoll-Rand Co., Montreal, P. Q.



BUCHANAN ALL-STEEL CRUSHER

Type "B" Jaw Crusher

Frame is a solid casting of open-hearth steel in one piece having a tensile strength of 60,000 to 65,000 lb. per square inch, three or four times stronger than cast iron and with at least three or four times the rigidity of the built-up rolled steel-plate crusher.

Jaw and Cheek Plates are of the best Manganese Steel, made reversible for double wear—Adjustable Jaw Stroke—Shim Adjustment—Safety Toggle—Reversible Steel Toggle Seats—Phosphor Bronze Frame Bearings (in smaller sizes)—Steel Swing Jaw and Pitman—Pitman water jacketed and parting in larger sizes.

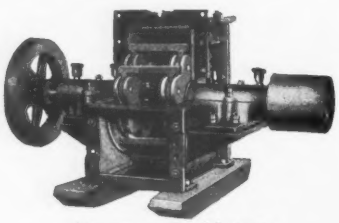
Built in sizes up to 18" x 36".

Large Crushers, Crushing Rolls, Complete Crushing Plants

Write for Bulletin No. 9

C. G. BUCHANAN COMPANY, Inc.

Cedar and West Streets, New York City



Manganese Steel Linings

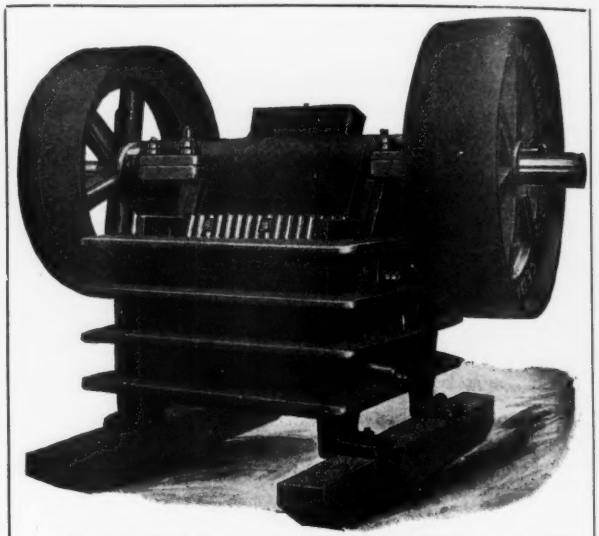
USERS OF "K-B" PULVERIZERS

requiring additional tonnage are ordering "K-B" equipment.

May we tell you why?

K-B PULVERIZER

K-B Pulverizer Co., Inc.
92 Lafayette Street
New York



UNIVERSAL STEEL LINE

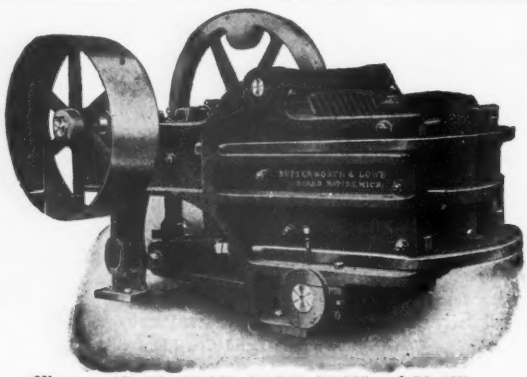
THE PERFECT GRAVEL AND REJECTION CRUSHER

Sizes up to 8"x36". Capacities 20 to 200 tons daily. Crushes to ¾" and finer if desired. Has no superior for FINE CRUSHING and UNIFORMITY of product.

STRONG LIGHT DURABLE ECONOMICAL

UNIVERSAL CRUSHER CO.

225 Third Street Cedar Rapids, Iowa, U. S. A.



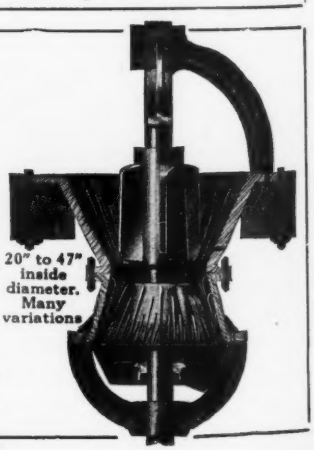
Nippers—17x19", 18x26" 20x30", 24x36" and 26x42"

JAW & ROTARY CRUSHERS

For All Rocks and Ores Softer Than Granite

GYPSUM MACHINERY—We design modern Plaster Mills and make all necessary Machinery, including Kettles, Nippers, Crackers, Buhrs, Screens, Elevators, Shafting, etc.

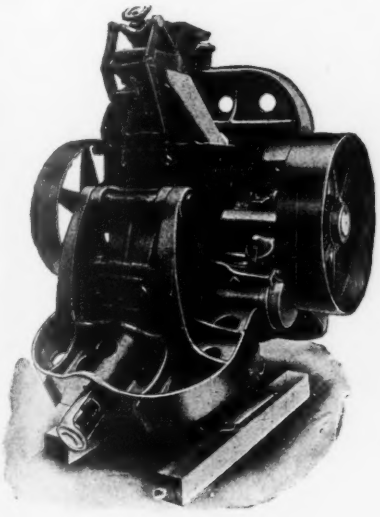
Special Crusher-Grinders for Lime



20" to 47" inside diameter. Many variations

Butterworth & Lowe

17 Huron St. Grand Rapids, Mich.



MAXECON MILL

For Fine Pulverizing of

Limestone, Gypsum, Phosphate, etc.

EFFICIENT—ECONOMICAL—RELIABLE

PERFECTECON SCREEN SEPARATOR

For Large Capacity Screening

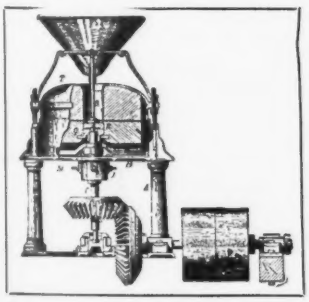
Let These Solve Your Cost and Trouble Problems

KENT MILL COMPANY

10 Rapelye Street **Brooklyn, N. Y.**

Do You Do Fine Grinding?

THE Munson Underrunner Buhr Mill has stood the test of time and is still first choice with a large number of concerns whose product demands fine, uniform grinding.



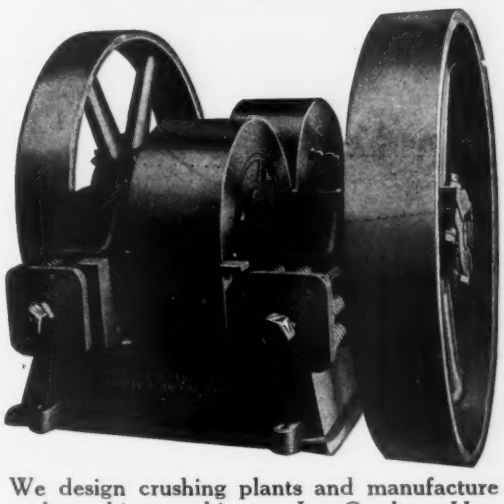
This mill is particularly well adapted for grinding limestone, gypsum, hematite ores, slate and similar materials, though in actual service it is used on a much wider variety of products.

Send us a sample of the material you wish ground so that we may tell you the possibilities of the "MUNSON."

Catalog No. 71 tells more about these mills.

Munson Mill Machinery Co., Inc.

Est. 1825 **Utica, N. Y.**



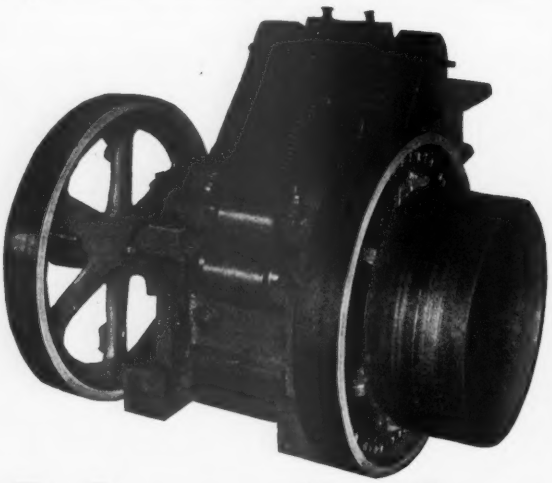
We design crushing plants and manufacture rock crushing machinery—Jaw Crushers, Hercules, Giant and Heavy Duty Crushing Rolls; also screens, centrifugal pumps, elevators, stone buckets, sheet metal work, stone cars, etc.

If you want the best, irrespective of price, we can supply it.

WEBB CITY & CARTERVILLE FOUNDRY & MACHINE WORKS

WEBB CITY, MISSOURI

Engineers **Founders** **Machinists**



Reliance Crushers

IN ALL SIZES FOR EITHER PORTABLE PLANTS FOR ROAD BUILDING OR STATIONARY QUARRY INSTALLATIONS.

BUILT FOR LONG, HARD SERVICE—WILL SAVE YOU MONEY IN THE LONG RUN

Let us quote you prices

Universal Road Machinery Co., Kingston, N. Y.

Branches in all principal cities in U. S. and Canada

MANUFACTURERS OF THE FAMOUS RELIANCE LINE OF ROAD BUILDING AND QUARRY EQUIPMENT

Thirty Two Years Ago

The First Champion Crusher Was Built

Since that time more than 6,000 crushers have been sold and users are to be found in every country in the world. The Champion is a slow speed, steel frame crusher, with a large capacity and low upkeep cost. Made in many sizes from 50 to 1000 tons' daily capacities.

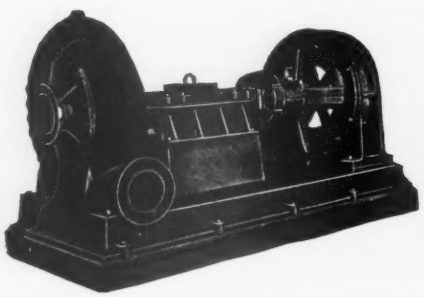
No. 20 (22 by 50) Champion Steel Rock Crusher

We design, build and install complete crushing outfits of any size desired. We specialize in the building of Elevators, Screens, and Conveyors of any desired capacity.

Ask for catalogue, "Champion Crushing and Quarrying Machinery." It is free.

THE GOOD ROADS MACHINERY CO., INC.

1203 Tower Building, Chicago, Ill. — Kennett Square, Pa.



Heavy Service Dredging Pump

Where conditions are too severe for our standard sand pump, the above type is recommended.

It is built in sizes from 4 in. up, arranged for belt, motor, or engine drive.

MORRIS MACHINE WORKS

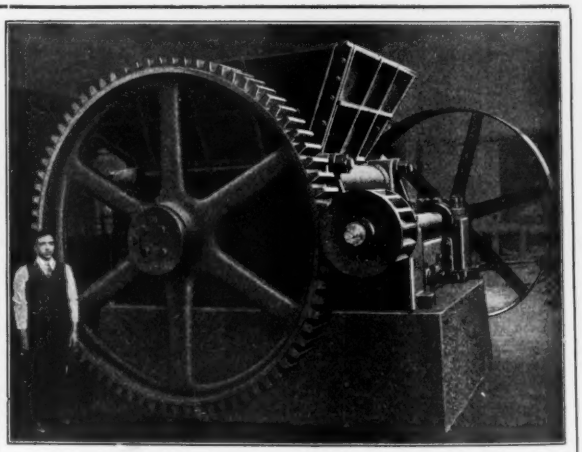
50 Genesee St. Baldwinsville, N. Y.

39 Cortlandt St., New York City
Forrest Bldg., Philadelphia, Pa.
217 N. Jefferson St., Chicago, Ill.
Penobscot Bldg., Detroit, Mich.

Bulletin No. 19-B fully describes our complete line of sand and dredging pumps. Have you your copy?

MORRIS

Since the Civil War Builders of Centrifugal Pumps, Hydraulic Dredges, and Steam Engines



If you had seen the McLanahan Single Roll Crusher before ordering your first Gyratory or Jaw Crusher, you would now be running only the McLanahan Crushers.

After many years' practical experience building and operating other crushers, we brought out the first Single Roll Crusher, proved it best, simplest and most economical—making least fines—requires but little head room—no apron or hand feeding—takes wet or slimy material.

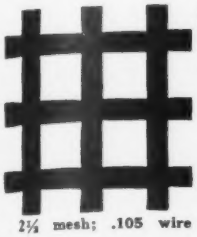
Capacity, 5 to 500 Tons Per Hour

McLanahan-Stone Machine Co.

Hollidaysburg, Pa.

Screens, Elevators, Conveyors, Rock Washers, Etc.

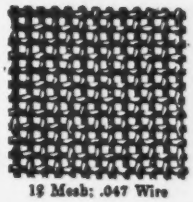
"CLEVELAND" DOUBLE CRIMPED WIRE CLOTH



2½ mesh; .105 wire

A uniform fineness is assured by the use of "Cleveland" Double Crimped Wire Cloth, making it unequalled for the screening of Sand, Gravel, Crushed Stone and Cement. "Service" is the definite policy of this organization, and through every phase of manufacture this end is constantly before us.

A large stock always on hand. However, any special mesh will be manufactured to suit requirements. PRICES RIGHT

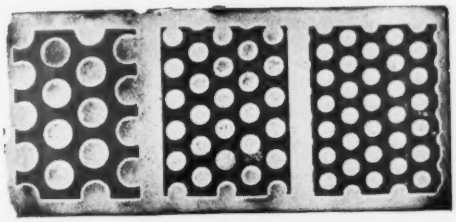


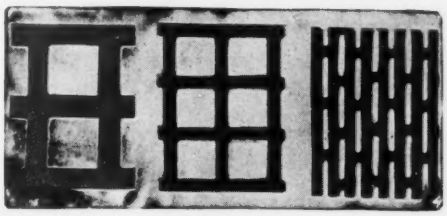
1¾ Mesh; .047 Wire

THE CLEVELAND WIRE CLOTH AND MANUFACTURING COMPANY

3573 East 78th Street **Cleveland, Ohio**

Perforated Steel Screens





For Screening Stone, Gravel, Sand and Cement

All sizes and shapes of holes in metal of proper thicknesses to give the best screening results.

Sheets furnished flat or rolled to shape for revolving screens.

THE HARRINGTON & KING PERFORATING CO.

621 N. Union Ave., Chicago, Ill.

NEW YORK OFFICE: 114 Liberty St.

Perforated Metal Screens

FOR

Stone, Gravel, Sand, Etc.

ELEVATOR BUCKETS

PLAIN AND PERFORATED

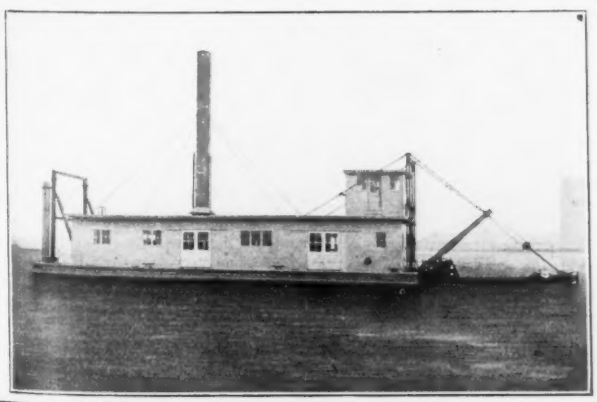
General Sheet and Light Structural Work

"Light and Heavy Steel Plate Construction"

HENDRICK MFG. CO.

CARBONDALE, PA.

New York Office, 30 Church Street
Pittsburgh Office, 544 Union Trust Bldg.
Hazleton, Pennsylvania, Office, 705 Markle Bank Bldg.



Sand & Gravel Dredges

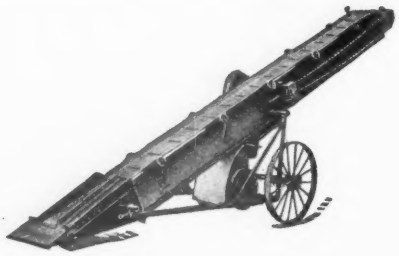
Our latest bulletin describes complete sand and gravel dredges, either steam driven, as illustrated, or electric, or oil engine driven.

Send for Bulletin 1945

Ellicott Machine Corporation

1221 Bush Street

BALTIMORE, MARYLAND, U. S. A.



The ROBINS 20 ft. PORTABLE

$527.00 F. O. B. Passaic, N. J.

A Troughed Belt Conveyor—No Skirt-Boards

This makes it possible to handle sand, gravel, crushed stone, and other abrasive materials without damage to the edges of the belt.

Features:

16" Troughed Belt, large carrying capacity.

Self-cleaning arched frame, fully protecting the return belt from dirt accumulation.

Rugged construction, well balanced.

Power—2 H.P., A.C. motor, 2 or 3 phase, 60 cycle. If equipped with 5 H.P. "NEW-WAY" Engine—$81.00 additional, f. o. b. Passaic.

Robins Conveying Belt Company

New York Chicago Boston Pittsburgh

"Industrial" Crane Cuts Force 75%

Users of "INDUSTRIAL" Locomotive Cranes report: "Three men and our type E, 15-ton 'Industrial' now do work which formerly required twelve men."

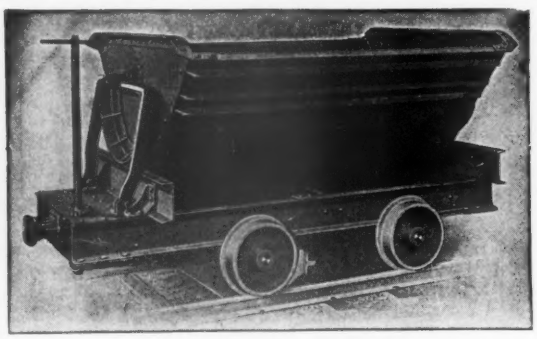
"OUR 'INDUSTRIAL' paid for itself during the first year's operation—saving $15.66 per car loaded over hand labor."

"With the $7,200 that it would take to pay the wages of six laborers for a year, we can pay the cost of operating the CRANE, including the operator, the interest on the money invested and the depreciation, and can do many times the work of six men and do work that it would be impossible to do in any other day without great cost."

Take a look around your plant and consider whether an "INDUSTRIAL" could save money for you as it has for the above people. Names will be furnished upon request.

INDUSTRIAL WORKS

BAY CITY, MICH.



More Than Reinforced

Reinforcing a dump car makes it stronger, of course. But there is a best way to reinforce. Atlas cars are reinforced the best way. Why? Simply because we have built dump cars so long and for so many people that we know just where the reinforcing should go and just how it should be done.

Not much wonder, then, that Atlas dump cars stand the "gaff" better than the average.

The Atlas Car & Manufacturing Co.

ENGINEERS MANUFACTURERS

CLEVELAND, OHIO, U. S. A.

Keep up with the Rock Products Industry

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Pit and Quarry men recognize the value of well built, powerful machinery. Osgood Steam Shovels have a prominent place in pits and quarries because of their simplicity in design and operation, durability, and low upkeep costs. Ask for Bulletins.

Railroad types 1½ to 6 cu. yds.
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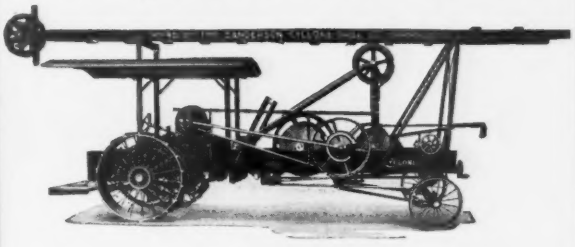
The OSGOOD Company
Marion, Ohio, U. S. A.

The Cyclone No. 14 Junior



A Drill for Plants of Limited Production

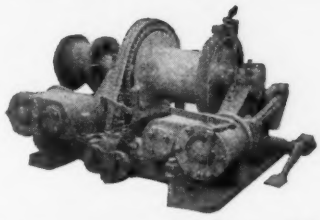
FOR a number of years there was a demand for a small and light blast hole drill of the well driller type capable of handling drilling tools of medium weight used for drilling holes from 4 to 5 inches in diameter. Many lime plants, some cement rock and sandstone quarries, pits producing shale for brick manufacture and quarries having shale overburden that requires blasting, have need for such a drill.

To meet this demand, the Cyclone No. 14 Junior drill was placed on the market two years ago. In design it is a counterpart, only built on a smaller scale, of the No. 14 Standard (now called Standard to distinguish it from the Junior), which is now over thirteen years old, having grown up with the big hole method of drilling and blasting. The same care and workmanship are maintained in the Junior. It has cast steel working parts. It is lighter and speedier and may be had at a lower first cost than the No. 14 Standard which, for plants as described in the preceding paragraph, is a little heavy and has a surplus capacity.

The No. 14 Junior and the No. 14 Standard make a complete line of big blast hole drills. They are fully described in our Catalog B-45. Write for a copy.

THE SANDERSON-CYCLONE DRILL CO.
ORRVILLE, OHIO
Eastern and Export Office: 30 Church Street, New York City

FOR SALE



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IMMEDIATE SHIPMENT

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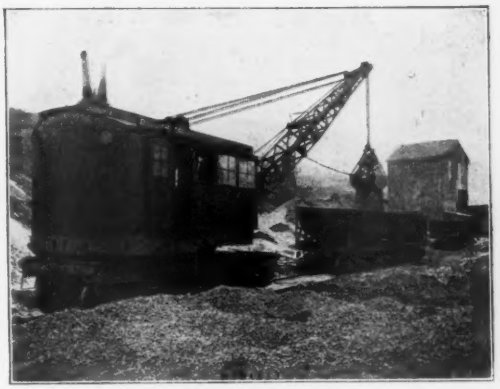

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That's what the Duluth Crushed Stone Co. says about the performance of their "AMERICAN" Locomotive Crane. In addition they use it extensively for switching cars, at which work it has proved both fast and powerful. On top of all they have found that it "Requires very little attention to keep it in first-class working order."

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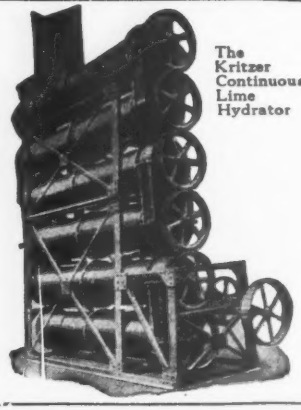
HOIST & DERRICK CO.
Saint Paul, Minn.
New York - Chicago - Pittsburgh - Seattle - New Orleans - Detroit



The Kritzer Continuous Lime Hydrator

HYDRATE

Years ago we helped our customers create a demand for their hydrate. Today the demand exceeds the supply. That's why every lime manufacturer should have an efficient, economical hydrating plant.

THE KRITZER Continuous Lime Hydrator is efficient in production and economical in operation and maintenance. Let us investigate exhaustively the local conditions peculiar to your proposition, and then apply our experience of many years and design a plant to meet those conditions.

A KRITZER plant, scientifically adapted to your conditions, will give you the best product at lowest cost

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For the Life of the Belt

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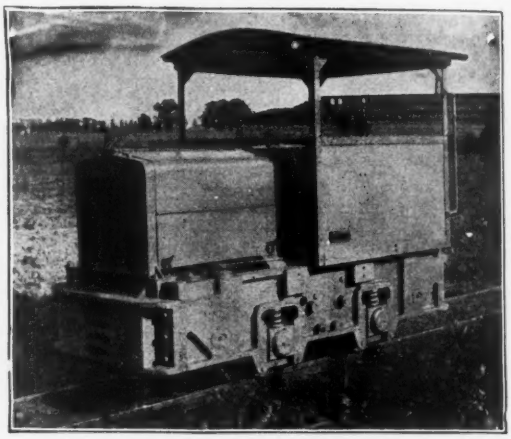

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The success of Whitcomb locomotives in hundreds of plants speaks of their thoroughness of design and construction and dependability in time of need. We would be glad to tell you what they are doing for others.

Whitcomb locomotives are designed to work and built to overwork

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Design and build cement plants, rock crushing plants, power plants and industrial structures.

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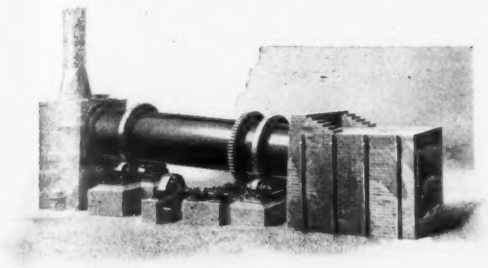

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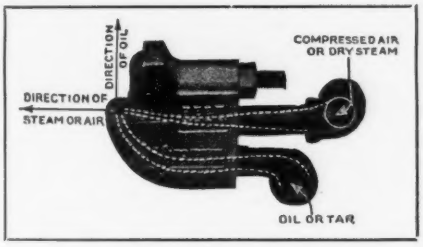
Our Rotary Dryers cover a wide range in size and capacity. They are built with the care that has characterized Hadfield-Penfield products for years, assuring durability, dependability and continuous service.

It will pay you to let us quote on your requirements

The Hadfield-Penfield Steel Co.
Bucyrus, Ohio



Calorex Oil Burners for boilers, locomotives, lime and cement kilns readily installed at a slight expense.

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At this stage of the lime burning game anybody can manufacture a Lime Kiln. We aim to build Lime Kilns and Hydrating Machinery of the best possible material and workmanship, but it is what goes inside of the steel work of any Lime Kiln that makes it function properly. Our practical experience and technical qualification, together with the co-operation of the foremost Lime and Hydrating Engineer in the country, enable us to build the Kiln and put into its interior construction those features that produce proper results. It is your loss if you don't consult us on Kiln construction and operation.

We also manufacture:
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Hydrators
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Tanks
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The O. S. Dependable Crane is worth more to the user as a dividend-earning proposition because it is designed and constructed with the view of strength, durability, and dependable service.

Let us send you the name of the user nearest you. You will find him an O. S. "booster."

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A sturdy, strong, pulsating type of pump. Performance is positive. More than 20 years in service has demonstrated its ability to stand the test of hard service. Priced right—immediate deliveries.

Emerson Foot Valves add to the efficiency of any pump.

Complete information and literature on request

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The Byers "Truckrane" can be driven to work just like any automobile. Saves time and expense on every job. One owner recently refused $50.00 rental per day for a two weeks job in Chicago. Ask for "Truckrane" Bulletin.

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Builders of Full Circle Cranes, "Auto-Cranes," Buckets, Hoists, etc.

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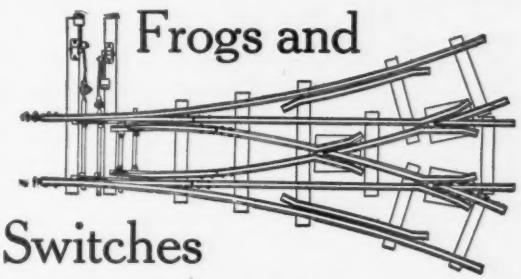

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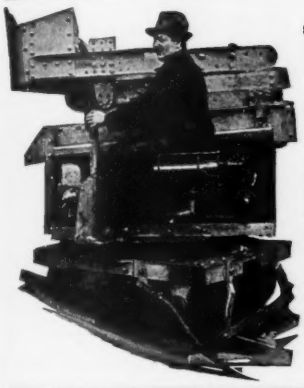
Frogs, Switches, Crossings, Switch Stands, Rails, Angle Bars, Fish Plates, Throws, Rail Braces, Tie Plates, Portable Track, Etc., Etc.



The HOAR Underground Shovel

Our engineering staff will make a guaranteed performance that this machine will lower costs and increase production.

THE HOAR SHOVEL COMPANY
214 Sellwood Building
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Our screens produce a product clean and perfectly sized.

We can supply repair and renewal parts quickly and correctly. Rush orders can be filled promptly because of our stock of 500 tons or more of steel plates.

Cross Engineering Company
Offices and Works:
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Gruendler Hercules Crushers are reducing production costs in hundreds of plants throughout the country.

"America's Famous Crushers"

For Crushing and Pulverizing Limestone, Lime, Gypsum, Shale, etc., a Gruendler cannot be beat.

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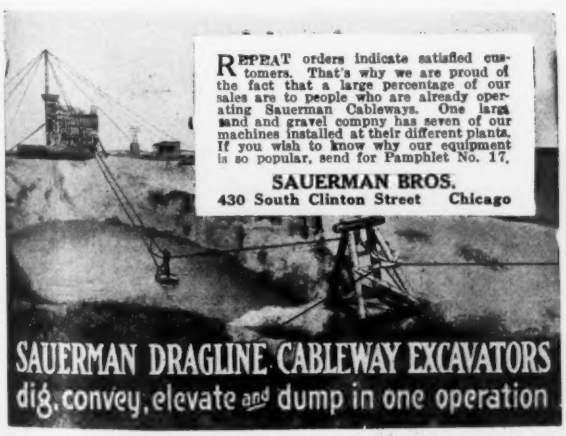
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SAUERMAN DRAGLINE CABLEWAY EXCAVATORS
dig, convey, elevate and dump in one operation

We Look Into the Earth

By using Diamond Core Drills. We drill for Limestone, Gypsum, Tale, Fire Clay, Coal and all minerals.

We are fully equipped for testing foundations for bridges, dams, buildings, and all work of a similar character.

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Locomotive—Crawler—Traction

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Equipment for Moving Materials

THE McMYLER-INTERSTATE CO.
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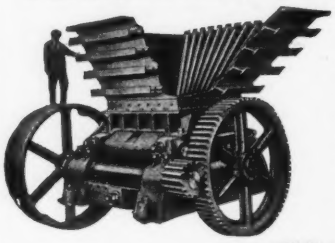
INTERSTATE

"PENNSYLVANIA" Single Roll Crusher



The New Series of "Pennsylvania" Single Roll Crushers take steam-shovel feed of limestone, cement rock, gypsum and similar materials, — wet and sticky, — without feeder, and make maximum reduction in one operation. All parts readily accessible. Maintenance cost lower per ton than for any other type. Massive construction — Reliable Safety Devices — Convenient adjustment. Capacities 5 to 450 tons hourly.

Put Your Reduction Problems Up to Us

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ANCHOR BRAND COLORS

For Mortar, Cement and Brick—
Brown, Black, Red and Buff
—Strongest and Most Durable

Manufactured by

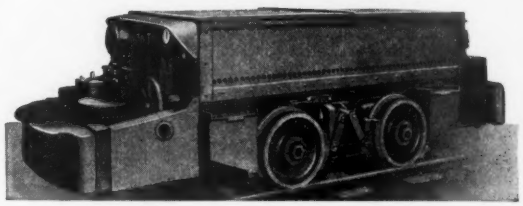
C. K. Williams & Co.

Correspondence Solicited EASTON, PA., U. S. A.

THE IRONTON STORAGE BATTERY LOCOMOTIVE

Efficient, economical hauling. Find out about storage battery locomotives for your hauling. The Ironton is the best storage battery locomotive.

The Ironton Engine Co.
Ironton, Ohio



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made in three different sizes and four different lengths — capacity from one to two hundred tons per hour.

Write for catalog and prices on revolving screens, jolt screens, elevators, conveyors, and primary or secondary rock crushers.

NEW HOLLAND MACHINE COMPANY
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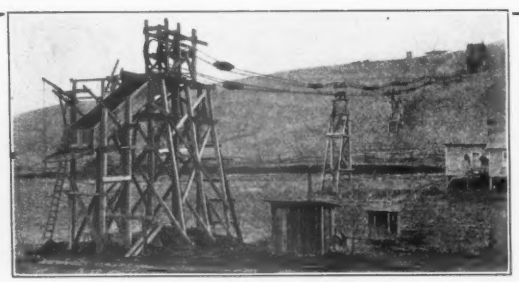
The Morgan Producer Gas Machine

is the highest class gas producer built in the U. S. and is advertised in this journal the second issue of each month.

Morgan Construction Company
Worcester, Mass.

W. D. Mount, 601 Peoples National Bank Bldg., Lynchburg, Va., Representative in the Lime Industry



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Your mine and railroad together as a unit is an AUTOMATIC AERIAL TRAMWAY. The use of this equipment will eliminate hauling difficulties and maintain output.

Let Us Demonstrate

Interstate Equipment Corporation 25 Church St. New York City

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PREVENTS HEAT PENETRATION

Heat Insulation

for Cement Kilns and Waste Heat Boilers

Sil-O-Cel Insulation possesses a lower heat conductivity than any other known material and will withstand extremely high temperatures. Furnished in convenient forms for easy application.

Detailed information and blueprints sent upon request. Write for Bulletin S-95.

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Released Stone Crushing Equipment

No. 7¼ K Allis Chalmers Gyratory Crusher. Straight Drive Shop No. 5367. Some $2000 worth of extra parts, including head and shaft, eccentric and gear, bushings, etc. All in good working order. Can ship immediately.

No. 4 Austin Gyratory Crusher. Straight drive. Extra eccentric, gear and other parts. Smooth head for fine crushing.

General Electric D. C. Generator. 2500 watts, 125 volts, belt drive. Suitable for lighting plant or driving small shop motor.

Cletrac Caterpillar Tractor. Shop No. 23644. Only used three months, but needs some repairs. Will sell at a bargain price.

Several small Steam Piston Pumps.
Some 6 H.P. to 10 H.P. Gasoline Engines.

A 10-ton Road Roller.

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Box 515 Kankakee, Illinois

1—50-ton standard gauge Brooks 6-wheel switcher.
1—28-ton standard gauge Shay geared locomotive.
2—9x14" 36" gauge 4-wheel saddle tank locomotives.
1—14-B Bucyrus steam shovel, mounted on traction wheels.
2—18-ton O&S bucket handling locomotive cranes.
30 Miles 56-lb. relay steel rails; Hawkinsville, Ga.
30 Miles 50-lb. and 56-lb. relay steel rails; Percy and Webb, Miss.

Birmingham Rail and Locomotive Company
Birmingham Alabama

SPECIAL BARGAINS

Send Us Your Boiler Inquiries

66x86 in. TRAYLOR JAW CRUSHER.
25-50-80-110 HP. Elec. Hoists.
Nos. 4-5-6-7½-9 and 10 CRUSHERS.
6 and 12 ton Gasoline Locomotives.
2—DISC CRUSHERS, 36 in. SYMONS, also 28 in.
100-TON, 2½ yd. ELECTRIC SHOVEL.
50-5000 ft. Steam Belt and Electric Compressors.
13x30 in.; 10x18 in.; 8x14 in. JAW CRUSHERS.
24x54 McLANAHAN ROLL CRUSHER.
50 HP. P. D. D. HOIST, 440 V., 3 Ph. Motor Dragline Set; also 25 HP. Outfit.
NEW G. E. Gas Engine Sets, 5 and 25 Kw., 125 V.
NEW 1000 Gpm. Cent. Pump, 231 ft. head—"STANDARD UNDERWRITERS"—Motor—440 V., 60 Cy., 3 Ph.
2—1000 Gpm. Underwriters Steam Pumps, 100 lb.
NEW No. 5 GYRATORY CRUSHER (MICHIGAN).

Send us inquiries for your wants

Ross Power Equipment Company
Indianapolis, Ind.

FOR SALE

1 Sturtevant No. 2 Duplex Ring Roll Mill, with $1000 worth of repair parts. $5,000
1 6x60′ Rotary Dryer, complete. Perfect condition. $3,000
1 8x100′ Rotary Kiln.
2 New Allis-Chalmers Dryers, complete, 7′ hot end reduced to 5½′ at feed end, 60′ over all.
1 5½x22′ New Tube Mill, complete. $2,300
1 4x16′ good as new Tube Mill, complete. $1,000
1 5x9′ New Allis-Chalmers Tube Mill, complete. $1,200
2 33″ Fuller Mills, each, $1,000
1 No. 3 Universal Williams Mill. $800
1 No. 2 Regular Williams Mill. $600
1 Williams No. 2 Deck Sweeper. $1,000
2 12 Ton 36″ Gauge Porter Saddle Tank Locomotives. Each, $1,500
1 300 H.P. Allis Engine, battery of three 150 H.P. Casey-Hedges Boilers.
1 Vulcan Iron Works Hoist, Drum 5x5′, complete. $1,250

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Independent Life Building Nashville, Tennessee

Wire us your requirements at our expense—"If we don't have it we will get it"

Machinery For Sale

DRYERS—Direct-heat rotary dryers, 3x25′, 3½x25′, 4x30′, 5½x50′, 6x60′ and 7x60′; double shell dryers, 4x20′, 5x30′ and 6x35′; steam-heated air rotary dryers, 4x30′ and 6x30′.

KILNS—Rotary kilns, 4x40′, 5x50′ and 6x70′, 6x100′, 7x80′ and 8x110′.

MILLS—6x8′, 6x5′, 5x4′, 3x3½′ pebble and ball mills; 3′ March mill; 42″, 33″ and 24″ Fuller-Lehigh mills; 4½x20′, 5x11′, 5x20′, 5½x22′ and 6x20′ tube mills; 7½x13″, 9x15″, 16x10″ and 12x26″ jaw crushers; one "Infant" No. 00, No. 0, No. 2, No. 3, and No. 9 Williams' swing hammer mills; one Kent type "G" mill; 24″, 36″ and 40″ cage mills; 3′ and 4½′, 6′ and 8′ Hardinge mills; 18x12″, 20x12″ and 30x10″ roll crushers; No. 0, No. 1 and No. 3 Sturtevant rotary crushers; one No. 2 Sturtevant ring roll crusher; 5 roll and 2 roll No. 1 and No. 000, No. 00 and No. 0 Raymond mills; one No. 3 and No. 4 and No. 7½ Telsmith breaker; one 36″ Sturtevant emery mill; one 3 roll Griffin mill; 60″ chaser mill.

SPECIALS—Five automatic package weighing machines; jigs; 6x8′, 6x5′ and 4x3′ Newaygo vibrating screens; Richardson automatic scales; 8′ and 10′ Emerick air separators.
Air compressors.

W. P. Heineken, Engineer
95 Liberty Street, New York. Tel. Cortland 1841

Cement Mill Machinery For Sale

1—New 6′ diameter x 22′ long Bonnot Tube Mill, complete without drive pulley and with or without liners. Machine has water cooled bearing and is belt driven. Location—Bettsville, Ohio.
1—Used 6′ diameter x 22′ long Bonnot Tube Mill, complete with drive pulley, liners, pebbles, etc. In first-class condition. Location—Bainbridge, Pa.
1—Used 8′ diameter x 6′ long Kennedy Van Saun Ball Mill complete with drive pulley, liners, balls, etc. In good condition. Location—Bettsville, Ohio.
1—Used 8′ diameter x 22′ long dry grinding Kennedy Van Saun Combination Mill, complete with pulley, liners, balls, etc. In first-class condition. Location—Bettsville, Ohio.
1—Used 8′ diameter x 6′ long Allis-Chalmers Ball Mill, complete with pulley, liners, etc. In first-class condition. Location—Bainbridge, Pa.
1—Used 8′ diameter x 6′ long Kennedy Van Saun Ball Mill, complete with pulley, liners, etc., but without discharge head. In fair condition but requiring a new head. Location—Bainbridge, Pa.
A large stock of repair parts for all mills.
34 new unpunched tank steel plates, 280″x96″x 9/16″ thick. Total weight 154,424 lbs. Just sufficient to roll two 7x110′ Rotary Kilns, including butt straps.

KENNEDY REFRACTORIES CO.
Tiffin, Ohio

FOR SALE

No. 5 Gates Gyratory Style D Crusher.
No. 6 Gates Gyratory Style D Crusher.
Two Climax No. 2—9x16-in. Jaw Crushers.
70 H. P.—13x16-in. Erie City Steam Engine.
22x48-in. Hardie Tynes Corliss Steam Engine, complete.
Two G. E., 150 H. P. Motors, Voltage 220-240.
Worthington Steam Pump, 10x8-in.; 20-in. cylinders.
Two No. 0 Thew ⅝-yard bucket steam shovels mounted Standard Railroad Trucks.
Sanderson Cyclone No. 14 Well Drill, complete.

E. W. COOPER
174 Third Ave. N., Nashville, Tenn.

FOR SALE

GIANT GRIFFIN MILL

Complete with 100 h.p. G. E. motor; starter, rails and pulley with belt and extra parts.

Plant in operation less than 30 days

Price, $4,000, f. o. b. Porterville, Calif.

HOFF MAGNESITE COMPANY
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FOR SALE

2—8x110′ Rotary Kilns.
5—5x6x7x110′ Rotary Kilns.
5—5x21′ Tube Mills (1 has Silax lining, 3 steel lining, 1 without lining).
1—4′ 6″x29′ Coal Dryer.
2—No. 6 Gates Crushers.
3—5½x22′ Tube Mills.
2—6x50′ Rotary Dryers.
3—Kominuters.
6—Krupp Ball Mills.
3—33″ Fuller Mills.
2—6x60′ Rotary Dryers.

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OLLIE LAWRENCE, Stockertown, Pa.

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2—Bonnot 5′x22′ Compeb (tube) Mills.
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1—No. 6 Style K Gates Gyratory Manganese fitted
7—Sets 40x15 in. Anaconda Crusher Rolls

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8—14x22, 40-ton, 4-wh. American	
2—14x22, 40-ton, 4-wh. Baldwin	
5—13x18, 30-ton, 4-wh. American	
3—13x20, 30-ton, 4-wh. Baldwin	
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1—20 ton, 8 wheel 45 ft. Boom bucket handling Industrial

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Power Plant Machinery.

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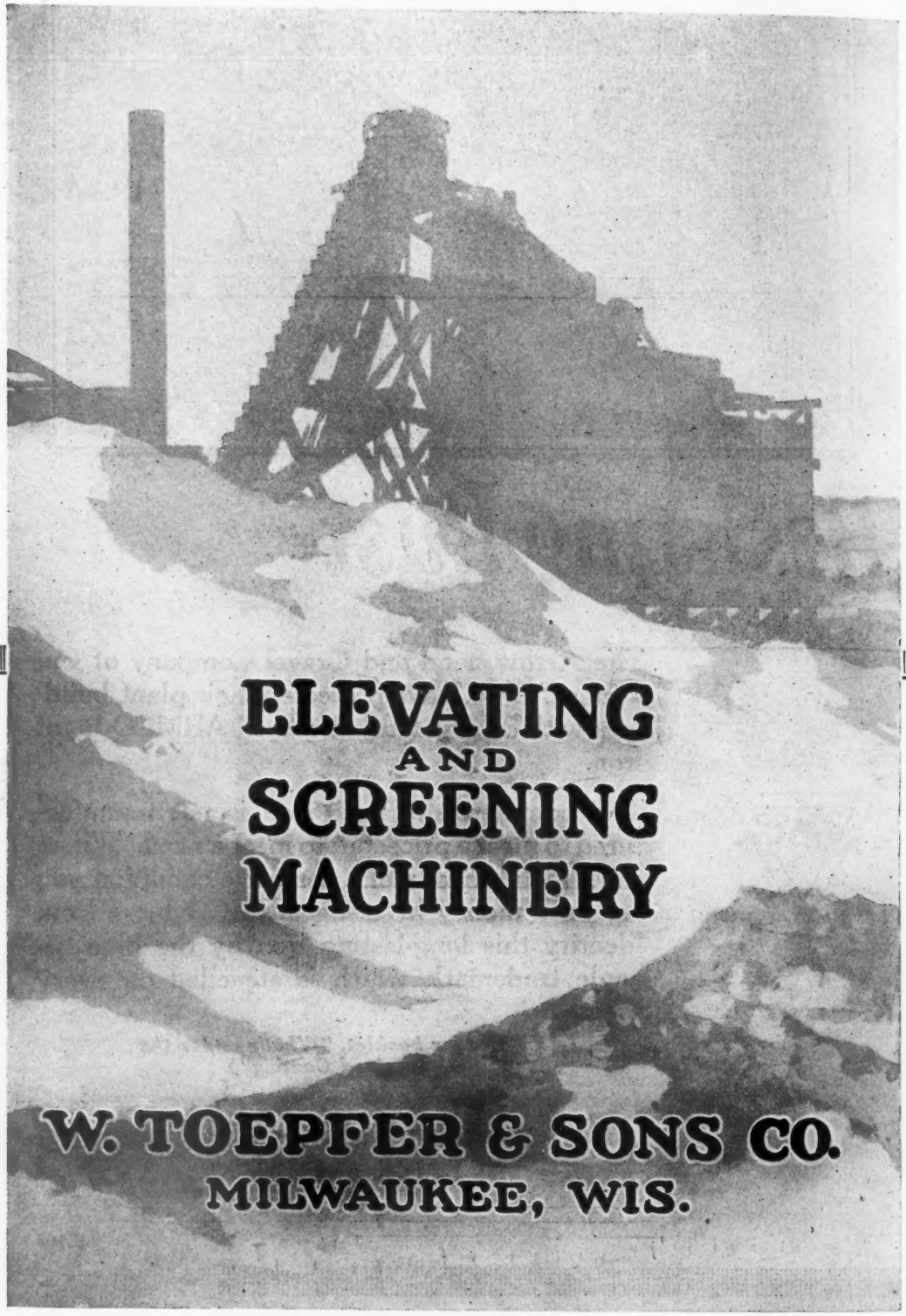

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1/16 "	3 "		
3/32 "	4½ "		
⅛ "	6 "		
5/32 "	7½ "		
3/16 "	9 "		
¼ "	12 "		
5/16 "	15 "		
⅜ "	18 "		

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PISTON PACKING

Style 329 Style 330

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3/32 "	60 "	1½ "	⅝ "	48 "	6½ "
⅛ "	60 "	2 "	11/16 "	48 "	7 "
5/32 "	48 "	2 "	¾ "	48 "	7½ "
3/16 "	48 "	2½ "	13/16 "	48 "	8 "
¼ "	48 "	3 "	⅞ "	48 "	8½ "
5/16 "	48 "	3½ "	15/16 "	48 "	9 "
⅜ "	48 "	4 "	1 "	48 "	9½ "
7/16 "	48 "	5 "	1⅛ "	48 "	10½ "
½ "	48 "	6 "	1¼ "	48 "	11½ "

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Rock Products

Entered as second-class matter, July 2, 1907, at the Chicago, Illinois, Postoffice, under the Act of March 3, 1879.

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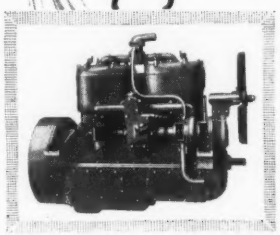

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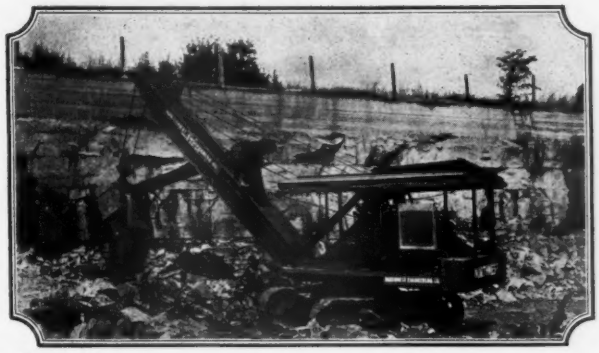
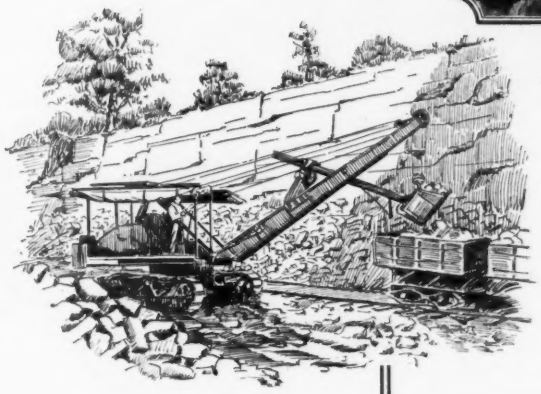




It is there that the Northwest Gas Shovel proves its real ability—not in the one time performance but in the day after day, year after year service.

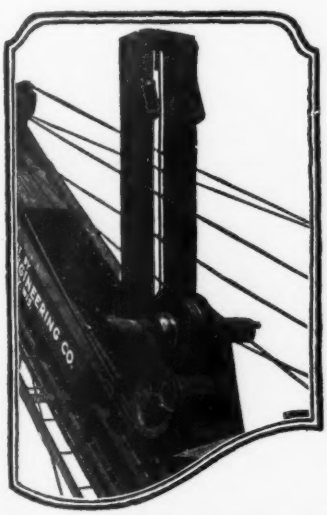
It's the crawling over ragged ground, the beat of the bucket on the rock formation, the grinding bite of the dipper, the strain of the boom and the wracking vibration hour after hour that puts the real test on the shovel. To glance at the construction of the Northwest, to watch it for a few minutes at its work is convincing proof of its sturdiness and strength.

But it's not what we say that has made the reputation of the Northwest—it's what the old timer—the man who has found the Northwest after years of experience with other makes—the man who knows them all—his is the say-so that counts, and his is the say-so that has built the Northwest reputation for service and endurance where the going is rough and the digging tough.

The Northwest Gas Shovel gives you from 15 to 25% greater power at the dipper lip. There are no gears and racks or auxiliary engines and drives to get out of order. The dipper has reversible manganese teeth that resist abrasion.

The crawler steers like a truck, securing the advantage of greater mobility, a patented Northwest feature, and the high power, heavy duty gas engine or electric motor provides ample margin of reserve power. These are the features that have made Northwest boosters.

Ask for a visit from a Northwest representative.



Only one motor—gas or electric—plenty of power for crowding — hoisting and shaking the dipper.

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NORTHWEST GAS SHOVEL

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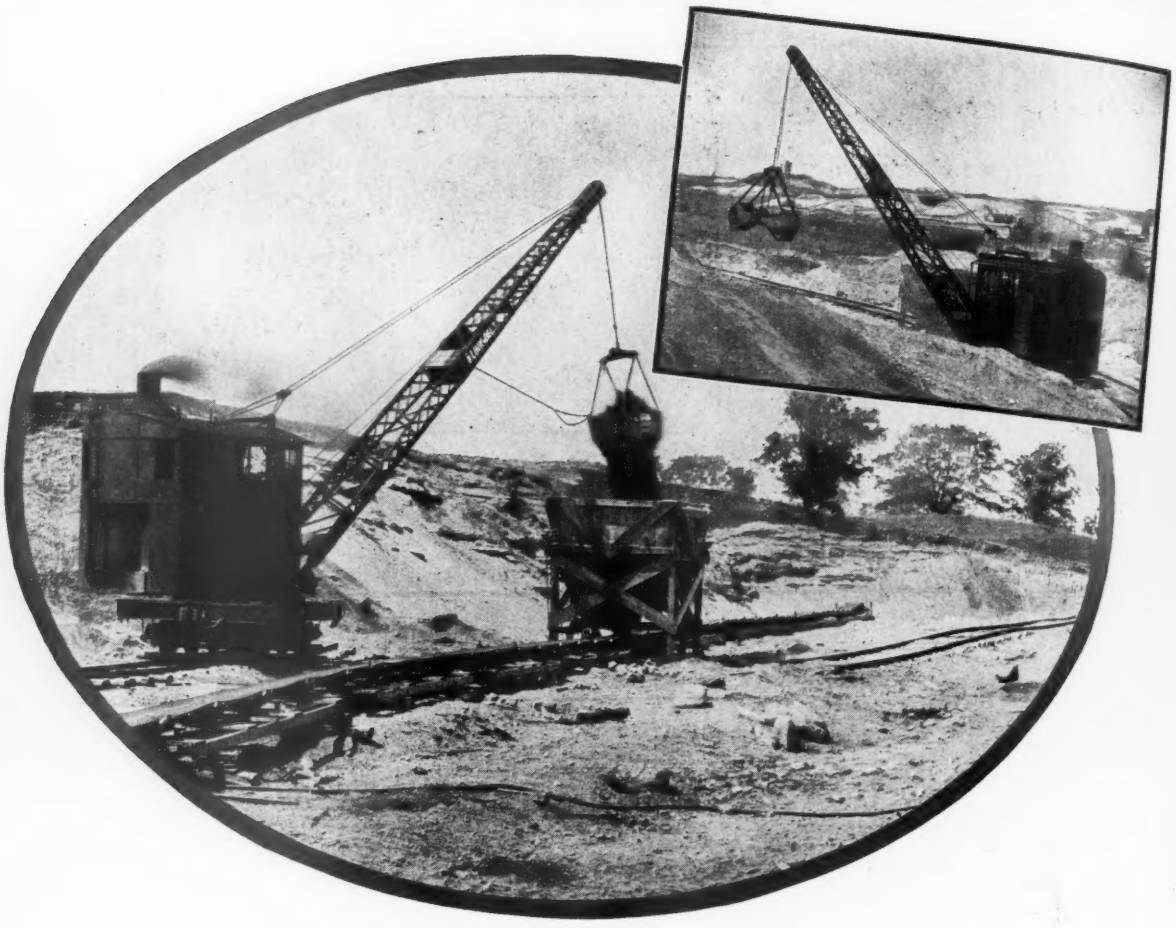

Put This Worker on Your Pay Roll

"WITH the Link-Belt Crane we have loaded 46 cars, of 50 tons capacity each, in a 10-hour day"—says Mr. Charles A. Jacobs, George W. Pyott Sand & Gravel Co., Chicago.

"We would have no difficulty in exceeding this if the occasion demanded", he continues. "We loaded 26 cars in nine hours, traveling three-eighths of a mile with each car load, for a period of over ten days, when our locomotive was out of service".

"The crane is of great value in shifting cars".

"For unusually fast operation, easy handling and excellent performance, we can truly say the Link-Belt crane far exceeds our expectations".

Link-Belt "Built-for-Service" Cranes do come up to expectations. This statement is but one of many from our clients the country over. Two Link-Belt Cranes are used by the Pyott Company.

When you need a Crane — put a Link-Belt machine on your Payroll.

1217

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Fuel Saving or Waste

Throughout these five crucial years, will your records show mounting production costs in the face of intense competition? Will they reveal an extravagant manufacturing process out of touch with conditions?

Or will they show conservative expenditures in spite of greater fuel costs—a management policy which is far-sighted and resourceful?

In many manufacturing processes, fuel costs control production costs; in all industry fuel is a determining factor. Fuel costs can be lessened and the capacity of all your heated equipment increased by installing

SIL-O-CEL

PREVENTS HEAT PENETRATION

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HEAT INSULATION

In five years, a 500 H. P. boiler operating 250 days per year at 200 per cent of rating saves approximately 1550 tons of coal when insulated with Sil-O-Cel. At an average of $4.00 per ton for coal on the grate this means a direct saving of over six thousand dollars in fuel within five years, —representing more than 100 per cent on the original investment for each year of service.

Sil-O-Cel possesses a lower conductivity than any other known material and withstands temperatures which destroy other forms of insulation. Furnished in four convenient forms for all types of equipment without change in design,—brick, block, powder, cement.

Write for Bulletin S-95 giving complete information, or mail the coupon.

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Celite Products Company,
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of .....
Name type of equipment

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important aids to successful blasting

121 years of manufacturing and field experience has enabled the du Pont Company to produce a complete line of blasting accessories of the same unvarying high quality as du Pont explosives. To insure the best results be sure that the du Pont label is on *all* your blasting equipment—on your accessories as well as on the explosives themselves.

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Write for Blasting Accessories Catalog containing descriptions of above accessories and practical information about their use.

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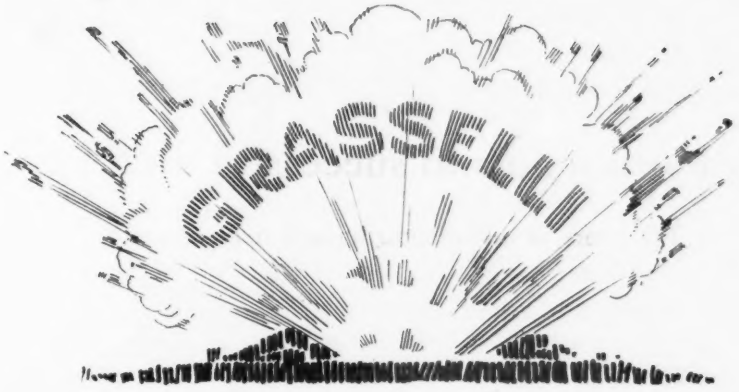

The First Shot!

If the first shot is successful, the entire blasting job is generally successful. The cost is always less.

Through its large staff of trained and practical field men, Grasselli endeavors to make reasonably sure of the success of the first shot—and of the blasting—by studying conditions at first hand.

Their observations and suggestions are often extremely valuable. Chances are there's a Grasselli man in your vicinity now. Write us and he'll call and discuss your operations with you.

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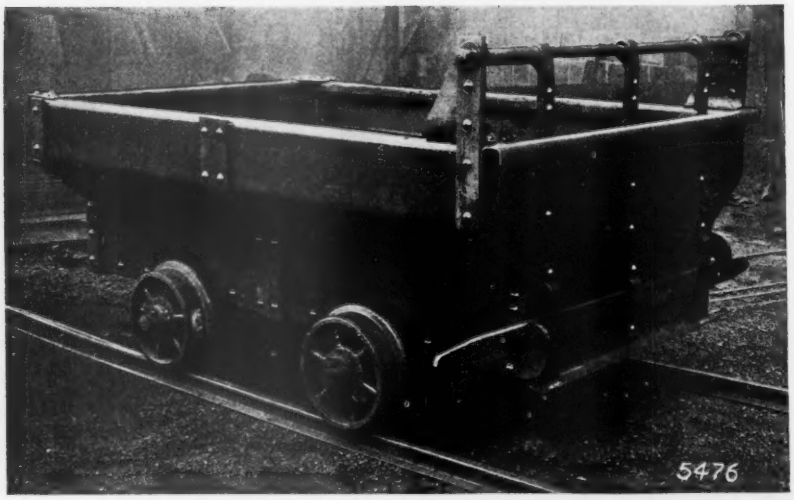
EASTON QUARRY CARS



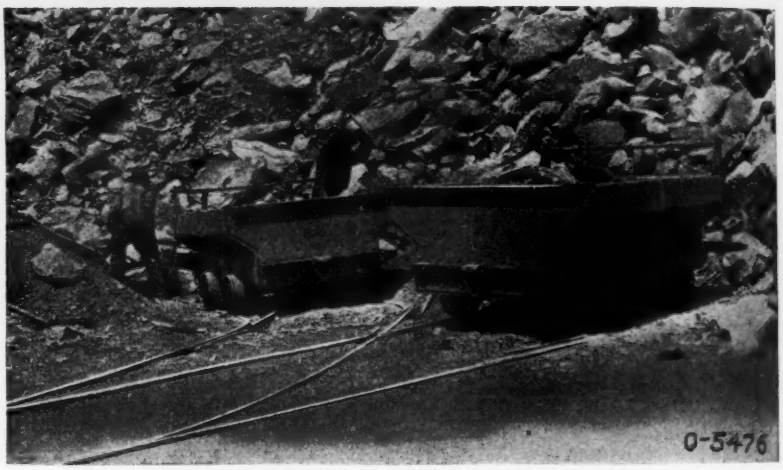
TYPE 5476

In Bulletin No. 21 we show 39 other types of Quarry Cars, for hand or shovel loading, a Quarry Car for every condition.

EASTON INDUSTRIAL CARS

"Quarry Car Practice"

Part four is now being distributed. Contains over 50 pictures, taken in quarries, making a total of over 200 pictures so far shown in this interesting series of bulletins.



CONSTRUCTION

These cars are being used by the quarry supplying all the crushed stone for that huge "Hill to Hill" concrete bridge at Bethlehem, Pennsylvania. Constructed of thick steel plate with top edges **rolled,** giving greater strength and beauty than does the usual angle top edge, also avoids all sharp edges which might injure or cut men in hand loading.

Low overall height, only 3 ft. 3 in., with a capacity of over 3 tons. Self oiling wheels, 14 in. diameter. End gate opens automatically. Made to dump front or rear end, as desired.

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EASTON CAR & CONS'T'N CO

The Manufacturers of

CLYDE DERRICKS

make sure of good service by using

WILLIAMSPORT WIRE "Telfax" Tape Marked ROPE

Clyde offers you a quality product and they know that Wire Rope plays a vital part in the efficiency of their equipment.

They made a **real** test of all Wire Rope and "WILLIAMSPORT" clearly outpointed in every test.

They are buying Williamsport on Quality—not price.

There are many cheaper ropes on the market—but why take a chance?

Cheaply made ropes would not dare contain the "Telfax" marker—Write for our free booklet on MWR. It tells why.

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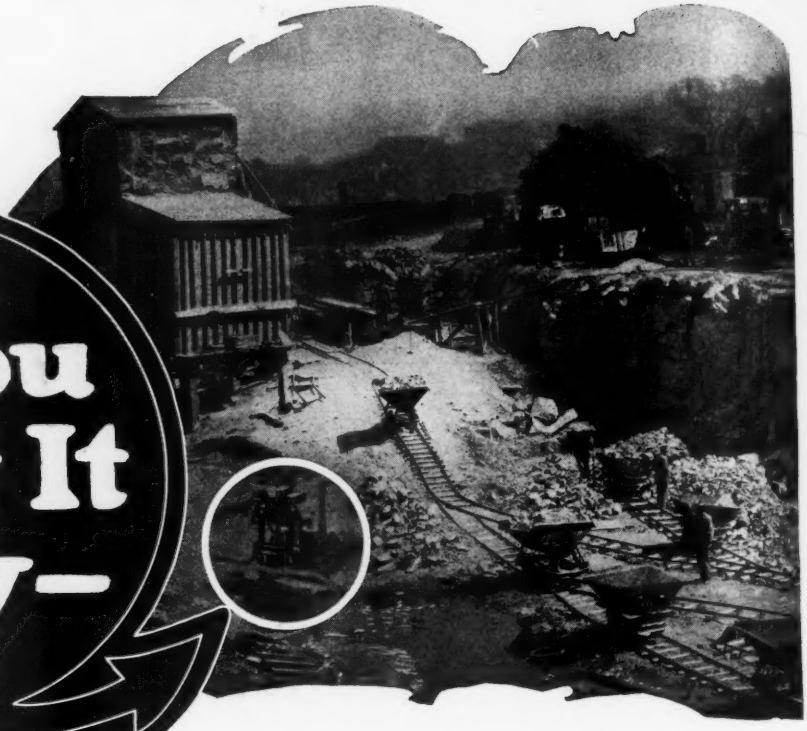
A FORD in the Pump Field

They don't rely on the sun to dry up things in this quarry. An Evinrude does the work faster.



If You Want It Dry—

—put an Evinrude Centrifugal Pump on the job. For getting rid of excess water it's the handiest little pumping outfit you can find. Costs less to buy or to operate than a big pump—doesn't waste labor like a bilge pump.

An Evinrude pumps 5000 gallons at a 20 foot head. Because of its compactness, it may be lowered into ditch, excavation or caisson. Submerge the pump right in the water. No "installation" needed. Works with or without a suction line. Two men can walk off with an Evinrude—weighs only 115 pounds. Power-plant is a built-in, 2 H. P. gasoline engine, the same as used in more than 150,000 Evinrude rowboat motors in the past dozen years.

The Evinrude Centrifugal Pump now serves more than a score of different industries. Disposes of drainage water in mines, quarries, gravel pits. Pumps out flooded building excavations and basements. Empties coffer dams, drains sewer ditches. Aids traction and public service companies with underground work. Used for priming sand dredge pumps.

DEALERS: Now is the time to concentrate on pump business. Write or wire for our proposition. Desirable territory still available

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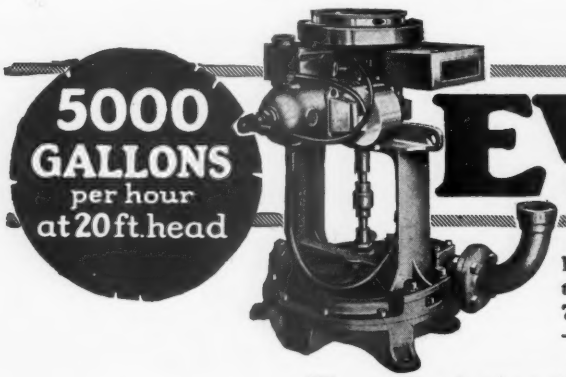

5000 GALLONS per hour at 20 ft. head

EVINRUDE CENTRIFUGAL PUMP

For users requiring a more powerful pump the Evinrude No. 1½ is recommended. 7400 gallons per hour at a 20-ft. head —3½ h.p. Evinrude motor. Price $175.

Price: $150.00 F.O.B. MILWAUKEE

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A Unique and Complete Service *–with Results* GUARANTEED

THE Edge Moor Iron Company's service to the cement industry includes far more than the mere designing and building of efficient waste heat boilers. From inception to full completion, this company assumes responsibility for the installation of each Edge Moor Waste Heat System, and guarantees satisfactory results.

The complete success of a waste heat system is dependent upon so many engineering phases that in order to be able to guarantee performance, the Edge Moor Iron Company specifies the equipment required for the waste heat plant.

Edge Moor engineers take charge of all preliminary work, assisting in design of new buildings or necessary alterations to existing structures, designing or constructing flues, installing boilers, economizers, superheaters, fans, and other auxiliary equipment.

This, without doubt, is one of the reasons why more than 70% of the total waste heat boiler horsepower in the cement industry is Edge Moor built.

Let us tell you how the wide experience of Edge Moor engineers can help to effect substantial economies in your plant. Your inquiry will place you under no obligation.

EDGE MOOR IRON COMPANY

Established 1868

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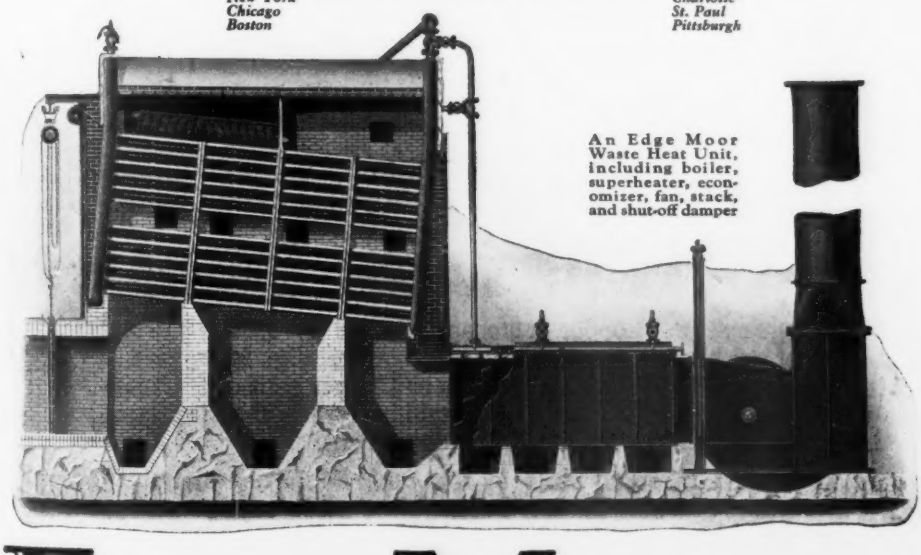

An Edge Moor Waste Heat Unit, including boiler, superheater, economizer, fan, stack, and shut-off damper

EDGE MOOR Water Tube BOILERS

FOR INCREASED FUEL ECONOMY

EDGE MOOR BOILERS — EDGE MOOR, DEL. U.S.A.

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McMyler-Interstate Buckets

When the boom swings over the hopper or storage pile and the operator drops the load, it's the bite of the bucket that counts. If the bucket digs in, hard; if it takes a real bite, your crane has a chance to work to 100 per cent of its capacity to reduce your material handling costs. You will be getting the maximum return on the investment you have made in your equipment.

In sand, broken stone and in small sizes of coal, this McMyler-Interstate Type R bucket is a real digger. It bites a bucketful! And it is quick acting and remarkably easy on cables.

Twenty-five years of bucket building experience are behind the Type R buckets. Every detail of their design and construction has been worked out under hundreds of actual operating conditions.

Type R buckets range in size from ¾ yard to 5 yards.

They are also built for operating with two opening and two closing ropes.

Locomotive Cranes · Car Dumpers · Coal and Ore Handling Machinery · Forgings
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The Latest One

EVERY up-to-the-minute quarry owner knows the Thew. And by the same token he's on the alert to know about the latest improvements in design and construction. That's the reason we have recently been broadcasting a new series of folders—to post you on the details of the latest Thew.

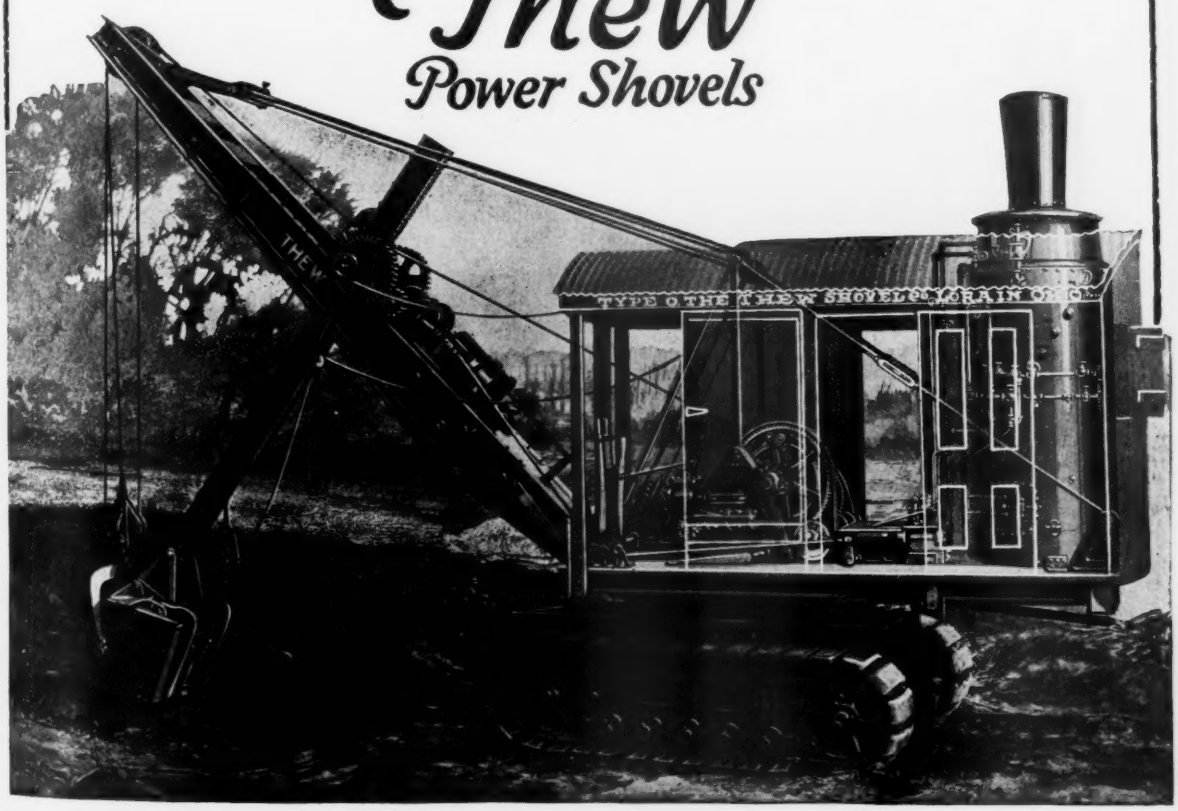
You will want this series (4 interesting folders) in your file. Not because they are works of art, nor because they are gems of literature, but because they will tell you facts you want to know.

These facts concern the features that have made the Thew the greatest result getter. They are told in plain, straight forward language without exaggeration. They are well illustrated and explain why the Thew is so far in advance of the ordinary shovel.

The last of the series goes out this month. If you do not receive your copy mention number 423 when you write.

THE THEW SHOVEL COMPANY, LORAIN, O.

Thew
Power Shovels



BUCHANAN CRUSHERS

Suggested Crushing Equipment for Plants Handling 1,000 Tons Per Day

Step No. 1 — Type "C" Jaw Crushers

For use with Steam Shovels

Such a plant might use Type "C" Crusher, size 24 in. x 36 in. or 36 in. x 54 in., crushing rock to 5 in. or 7 in. Type "C" is fully described in Bulletin No. 10. These are all steel crushers, especially intended for heavy and continuous duty. Built in 24 sizes—from 24 in. x 36 in. to 66 in. x 84 in. Capacities from 45 tons, 3-in. stone per hour to 450 tons, 12-in. stone per hour. Sectional jaw plates. Interchangeable upper and lower plates. Bearings with double system of lubrication.

Step No. 2 — Type "B" Jaw Crushers

Crushing Stone to 2 inches or less

The 5-in. or 7-in. rock from the Type "C" Crushers could then be further reduced to say 2 in. by Type "B" Crushers, perhaps two 16 in. x 36 in. or two 13 in. x 30 in. Type "B" Jaw Crushers are fully described in Bulletin No. 9. These are the Crushers with the solid cast open hearth steel frame, in one piece, four times stronger than cast iron and 3 or 4 times as rigid as built up, rolled steel plate crushers. In every detail they are simple, strong and efficient—ideal for the general work of the average mine.

Step No. 3—Type "C" Crushing Rolls

Reducing Stone to required fineness

If much fine material is required, the oversize from the foregoing crushers may be handled in one or more sets of Type "C" Crushing Rolls—say 36 in. x 16 in., or 42 in. x 16 in., taking stone 2 in. to ½ in. and reducing to required fineness. These rolls are fully described in Bulletin No. 13. They are built in all sizes and types, from 18 in. x 12 in. to and including 72 in. x 30 in. Every known improvement of any value, for efficiency and durability, is embodied in their construction.

Upon request we will be glad to send these fine Bulletins—in reality, more "text book" than mere Catalogs. All you need to know about each type of Crusher in each Bulletin.

C. G. BUCHANAN CO., Inc.

Cedar and West Streets, New York

Products:

Crushers—Crushing Rolls—Complete Concentrating Plant

ENDURINGLY EFFICIENT

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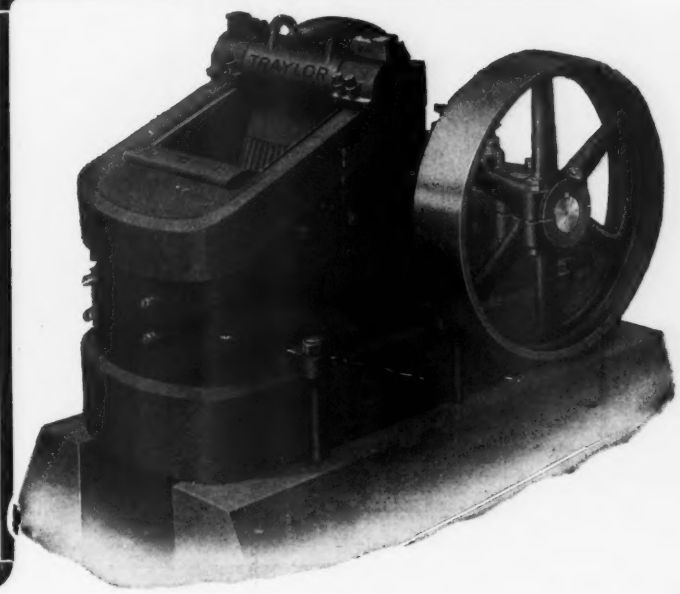
HERE ARE LISTED JUST A FEW ENTHUSIASTIC BULLDOG OWNERS



THE Traylor BULLDOG Jaw Crusher is of such advanced design as to definitely place it in a class by itself.

The design throughout is a radical departure from the antiquated Blake, which had, until the BULLDOG made its bow, remained practically unchanged since its inception.

Mere bulk, where unnecessary, has been eliminated. Weight and strength are scientifically placed where required.

Four exclusive features distinguish the BULLDOG—the world's most sensible — accessible — dependable crusher.

SEE BULLETIN 99R

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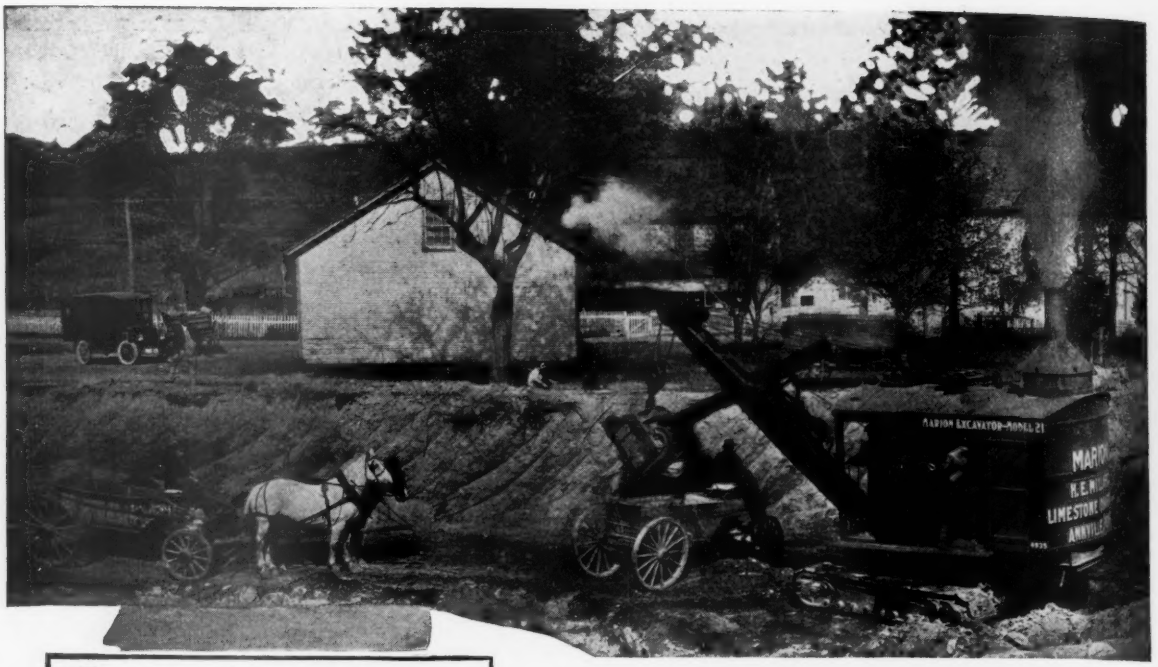


1 *Is the line of excavators complete for definite selection?*
Marion builds every required size in revolving and railroad types with dipper capacities from ¾ to 8 cu. yds.

2 *Has the dipper a Manganese front?*
Plate steel is cheaper but does not stand up under hard service Marion dippers have manganese fronts

3 *Are the boiler tubes electric welded?*
Tubes on our vertical boilers are electric welded to tube sheets—an operation that costs more but prevents leakage.

4 *Will the manufacturer maintain satis factory service?*
Marion stores a large quantity of replacement parts, ready for immediate shipment. Prompt service is assured

Protect Your Investment

Even the smallest power shovel represents an investment of considerable money Yet more than the purchase price is involved, for when the shovel is forced to idleness, everything stops.

On excavating work, continous profitable operation depends largely on the stability, efficiency and steady-going qualities of the shovel unit. Thus it pays well to investigate thoroughly before buying.

First of all, a shovel of the size best suited to your work should be selected. In this, Marion engineers will help. Then, complete details of construction should be checked point for point, and inquiry should be made to determine the reputation of the shovel manufacturer in the excavating industry and the policy toward the shovel user.

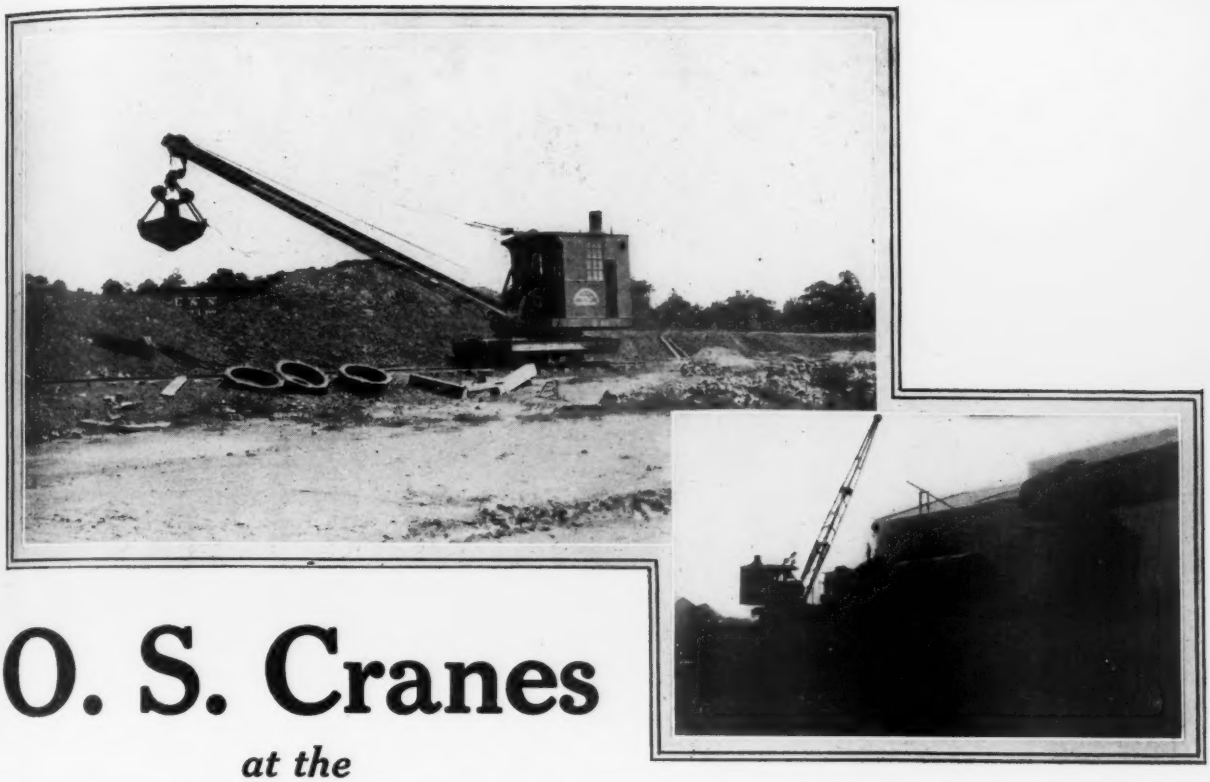
Pertinent questions on power shovels, like those at the left, will reveal much you may want to know. Marion will gladly answer any sincere query on Marion products.

Send for the Special Circular:—
"For your protection—22 questions to ask about Power Shovels."

281

The Marion Steam Shovel Company
Marion Ohio.

Marion Crawler Trucks Make Hard Going Easy



O. S. Cranes

at the

Indiana Portland Cement Co.

The Indiana Portland Cement Co. has found O. S. Dependable Cranes to be the handiest pieces of machinery about its plant.

They are put to a variety of uses here and there about the yard, saving time, saving money and more important still, during these labor shortage days, multiplying man power to a point where they have become indispensable. O. S. Cranes have quality built into them. Their manufacture is scientifically organized down to the last man and the last detail of every department with the single object of putting so much more value into the machine than is customary, that any operator can instantly recognize its superiority in performance and running costs.

Our catalog, fully illustrated,
will interest you

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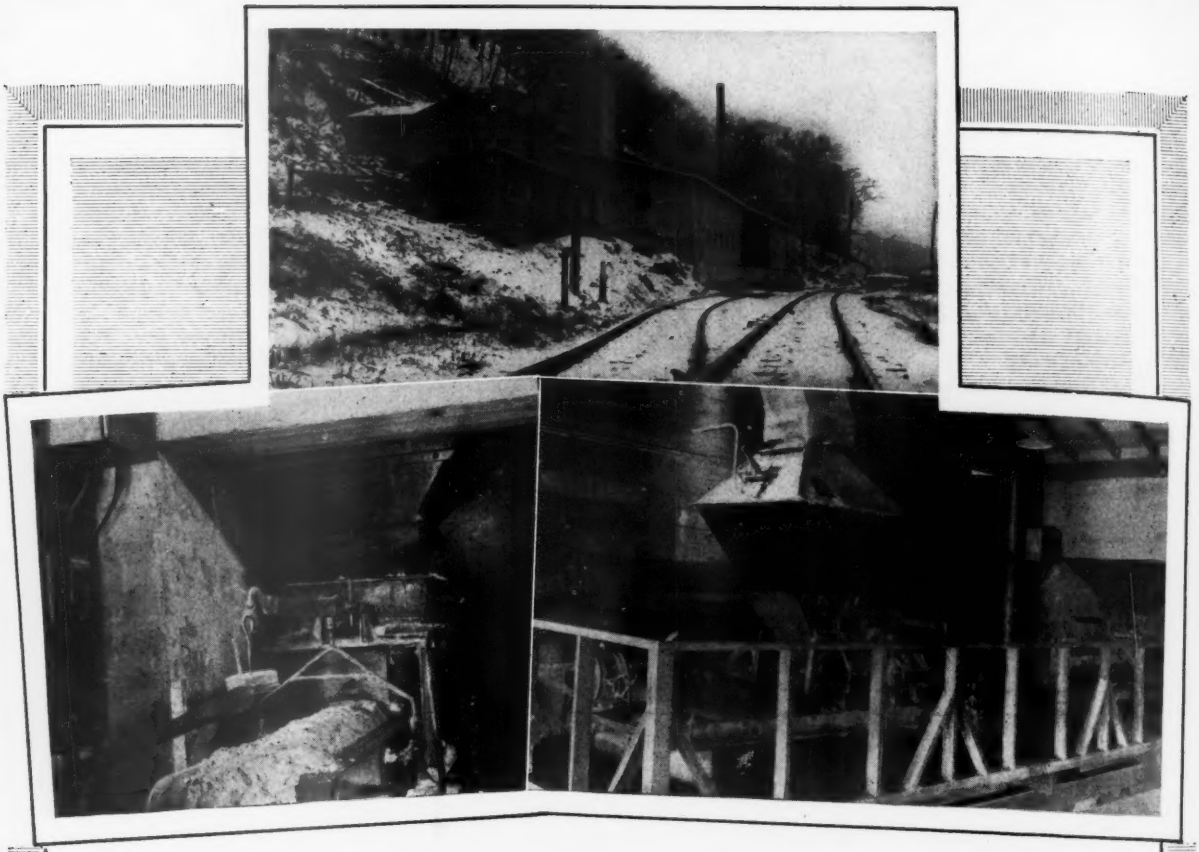
CHICAGO

Factory: Huntington, Indiana



SCHAFFER POIDOMETERS

At the Clayton Brick and Tile Co.

The plant operated by the Clayton Brick and Tile Co. is an unusually modern and efficient plant.

The design and equipment was selected only after months of intense investigation, studying the operation and machinery of various plants, not only in this country, but in Germany.

The fact that two SCHAFFER POIDOMETERS have been installed after this investigation, is a fine commentary on the efficiency reputation of our machine.

Years of operation in service has conspicuously demonstrated the remarkable efficiency and economy of the Schaffer Poidometer, and it is the acclaimed standard of its class.

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